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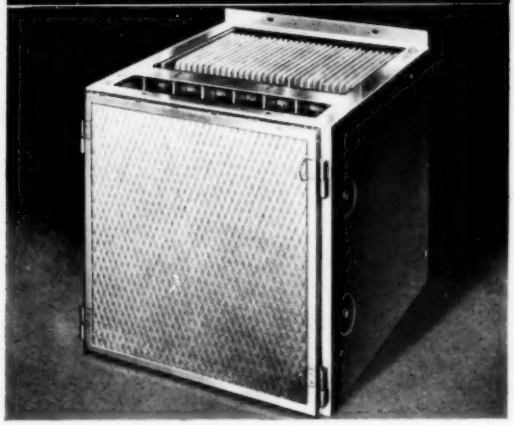

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Topics and Comments

Problems for Enoch

Since Mr. Enoch Powell became Minister of Health, newspaper correspondents have been vying with each other in attempts to curdle the blood of the pharmaceutical industry. They all start with the fact that Mr. Powell " stalked out " of the Government in 1958 in company with the then Chancellor of the Exchequer, Mr. Thorneycroft, over a violent disagreement about the size of the Budget which, to everyone's surprise, in the end amounted to a mere £60 million or so. With this daunting reputation for cutting public expenditure, Mr. Powell is an obvious inspiration for all sorts of speculation about how N.H.S. costs are to be cut. The new voluntary price control scheme which the industry is now working out with the new Minister will, it is predicted, make swingeing cuts in prices, particularly in the £30 million-worth of preparations classified as being identical with standard drugs. And there will also be control of publicity costs by the industry, it is alleged. Having thus summarily dealt with the industry, with a degree of success that has eluded his predecessors, Mr. Powell will then, it is predicted, raise the prescription charge from 1s. to 1s. 6d. All this is to be accomplished before Christmas, so it is said.

Let us take these speculations one by one. The voluntary price regulation scheme is certainly being overhauled. The former scheme's validity was extended six months—to December—by the former Minister, Mr. Walker-Smith. The A.B.P.I. and the Ministry are busy with the extremely complicated calculations for a new scheme. Matters will certainly not have been accelerated by the change of Ministers. Mr. Powell may be a brilliant man, but he has many matters to familiarise himself with and drug prices are only one. So it is not certain that the new scheme will be ready by December; it certainly won't be ready by early autumn, as the newspapers say.

Next, control of publicity expenditure. Just what formula is going to satisfy the conflicting demands of cheap drugs at home and good pharmaceutical exports? The Government is crying out loudly for more exports. Pharmaceuticals sell abroad on the reputation of their brand names. Is the industry to be told to play down publicity for the very brand names that helped it to export nearly £23 million-worth of drugs in the first six months of this year, an increase of 12½%? The two requirements are quite incompatible and, incidentally, pharmaceutical exports are not promoted by the Government publicising the view that many of our branded drugs are no better than standard B.P. preparations.

Finally, the prescription charge. It seems to us that an increase to 1s. 6d. would not be inconsistent with the general increase in prosperity over the past few years since the first shilling charge was imposed. However, the very poor and aged should be spared the extra expense and it should be perfectly feasible to provide for this.

In 1959 the pharmaceutical N.H.S. bill was about £73 million out of a total cost of £675 million. So it would seem that if savings are to be made other classes of expenditure might yield more than drugs. The £675 million represented 12·4% of all Government expenditure compared with 10·6% in 1949—this does not seem an unreasonable increase over ten years. The N.H.S. could only be afforded by an affluent society. Britain is an affluent society and its people want to continue to enjoy the N.H.S. They cannot be expected to enjoy it at the expense of the pharmaceutical industry which is not just composed of boards of directors but employs many thousands of people who, rightly, expect their proper share of the national cake.

New hope in hospitals

Fifteen years ago a hospital survey showed that 80% of samples of staphylococci were sensitive to penicillin G. Today, penicillin-resistant staph. are the major cause of hospital infections. That is the background against which to measure the achievement of Beecham Research Laboratories in developing a new penicillin which bids fair to defeat resistant staph. These bacteria are immune to ordinary penicillin because of their ability to produce penicillinase, the penicillin-destroying enzyme. The new penicillin—Celbenin—actually stimulates the production of penicillinase, but it has the remarkable ability of almost completely withstanding its effects and remaining active and thus able to deal with the pathogens. At the Middlesex Hospital, 118 samples of pathogenic staph. proved sensitive to Celbenin, whereas only 18% succumbed to penicillin G.

The new penicillin appears to have a comparatively narrow spectrum of activity and it is not active by mouth, requiring injection intramuscularly at intervals of 4-6 hr. in doses of 1 g. This large dosage is needed because of the relatively rapid excretion of the drug, so that the six-day course of treatment at present advised by the manufacturers will cost £19 10s. This level of cost will hardly please those who are alarmed at the drug bill rising to £75 million a year, but it will be interpreted differently by people who are cured by Celbenin.

The drug is the second to be developed from the work which yielded the penicillin nucleus (6-aminopenicillanic acid) in 1959. The discoverers were Batchelor, Doyle, Naylor and Rolinson and

their names appear in the ten papers which announced the new penicillin in the *B.M.J.* (September 3) and the *Lancet* (September 10). It is chemically sodium 6-(2:6-dimethoxybenzamido) penicillanate monohydrate. It is white and crystalline, sensitive to room temperature and unstable in acid solution.

The new drug gives doctors and hospital staff the chance to make a fresh start against staph. infection. The *Lancet* points out—and we agree—that no drug is ever likely to make hospitals safe unless it is used in a far more responsible and intelligent manner than has been usual since antibiotics became generally available. Bacteria are devilish cunning and amazingly adaptable. The use of drugs regardless only serves to generate still tougher bacteria. Doctors and nurses should learn more about bacteriology and plan their therapy accordingly. They cannot expect chemists to be able always to rescue them from the consequences of extravagant and uncritical drug administration.

Celbenin is now being produced in a pilot plant. It will soon be made in the new Beecham factory at Worthing, large-scale production being expected next year. It will also be produced in the United States under licence; there it will be called *Staphcillin*.

Medicine law reform

THE EVIDENCE submitted by the Pharmaceutical Society to the interdepartmental working party which is trying to tidy up our medicine laws contains few surprises. The general tone is set out in paragraph 2: all medicines should be subject to control as a general principle. The Society does not like the present policy, which is the exact reverse. A corollary of this attitude towards control is that both the preparation and distribution of medicines should be in the hands of qualified persons with only special exceptions.

To simplify the machinery of regulation the Society wants all control to be vested in three ministers: the Minister of Health, the Secretary of State for Scotland and the Minister of Agriculture. They would be advised by a new body, the Medicinal Substances Control Commission.

New legislation suggested by the Society includes a law restricting the supply of all new medicines to prescription only until such time as there is evidence justifying free sale. Owners of businesses concerned with the manufacture and wholesaling of medicines should be under the same obligation to employ qualified people as retailers of poisons. Furthermore, the preparation and supply of medicines in and from hospitals should be under the control of pharmacists.

These would be new provisions. The Society also recommends a number of changes in existing provisions in the Pharmacy and Poisons Act 1933, the Pharmacy and Medicines Act 1941 and the Pharmacy Act 1954. For instance, the use of the term "chemist" or other restricted term in the name of a corporate body should be prohibited. The Society should be given additional powers for registering or not registering premises. Inspectors should have the same power to enter any premises where poisons are made or sold as they have to enter registered premises. The 1941 Act should apply to treatments for the diseases prescribed as well as articles for treating these diseases. Finally the Society takes another step against unqualified persons by recommending that they should not be allowed to use descriptions like "drug store," "medical hall" and "chemists' sundries" in connection with retail sale.

The Society has certainly given the working party plenty to think about and its more sweeping proposals will arouse a good deal of controversy.

Conserving water with chemicals

THERE has been steady development of the process for preventing evaporation of water from dams and reservoirs by spreading a film of cetyl alcohol on the surface. It is comparatively simple to put the film on the water, the problem is to keep it there economically. To this end a great deal of research has been carried out by the C.S.I.R.O. in Australia, by experimenters in East Africa, and in this country by Price's (Bromborough) Ltd., who produce the cetyl alcohol in the requisite form.

Previous methods of dispensing cetyl alcohol have required constant supervision or expensive labour, while floating or land-based automatic continuous dosage dispensers are subject to pilferage or damage by humans and animals and to fire risks, Price's have now developed the Constant Feed Submerged Dispenser. It is based on the principle that a solution of cetyl alcohol in kerosene, when allowed to float to the surface of the water, spreads an evaporation-retarding film. The new device is designed for use with the standard, non-returnable kerosene can. It consists of a constant feed device packed in a carton with a polythene bag containing a weighed quantity of cetyl alcohol sufficient to give a 3% solution (1 lb. for a 4-gal. can). The feed device is a bung containing two tubes, in one of which is positioned a hypodermic needle. All the operator has to do is to rip off the cap on the kerosene can, shake in the cetyl alcohol, stirring until it is all dissolved, and then press the constant feed device firmly into the bung hole. Bricks or stones are tied saddlewise to the can to weight it and the complete unit is sunk in the reservoir. Water enters through the inlet pipe in the bung, forcing the cetyl alcohol solution out through the hypodermic needle in the discharge pipe and the drops float to the surface to form the film. One charge will cover ¼-acre for one month. More units can be used for larger areas, but the method is not considered suitable for areas above 1 acre as these are likely to be subject to strong winds which break the film. Since it is submerged the unit is kept at a uniform temperature, so the viscosity of the solution and hence the rate of discharge remains constant. Price's plan to sell the complete unit at 10s. There is likely to be a

wide demand both overseas and in this country.

Coinciding with the news of the dispenser comes a report from the National Chemical Laboratory, Poona, India, of new compounds claimed to be more effective as evaporation retarders than cetyl alcohol. The compounds are glycol mono alkyl ethers. According to a paper in *Nature* (September 3, pp. 870, 871) they have given better reduction of evaporation than cetyl alcohol by at least 30% in the summer as well as the winter. The process for the preparation and use of the new compounds is being patented.

The wide interest in these chemical methods of water conservation will provide the means of saving hundreds of millions of gallons of water in those arid areas of the world where the precious liquid makes the difference between life and death.

Purification with ozone

As a component of the atmosphere, the bluish gas ozone filters out most of the harmful ultra-violet rays in sunlight. For over 100 years it has been used commercially for various purification and deodorisation processes. Since it cannot be economically transported, it must be manufactured on site and a variety of ozonators have been developed to generate the gas.

The first industrial ozonator was built by Siemens in 1857 on the discharge principle for ozone formation. Modifications of this unit have led to the prototype of present-day designs. All commercial ozonators are based on the principle of electric discharge through dielectrics, which act as stabilising resistances. Ozonators have no moving parts and have a life expectancy of about 25 years. Ozonators containing multiple units with outputs up to 100,000 lb./day, have been built in the United States.

Commercial generators are constructed with stainless steel tubes fastened into a stainless steel shell, which serves as a cooling jacket. A glass dielectric is mounted concentrically in the centre of each tube. The dielectric tube is coated on the inside with an electrically conductive material. In operation dry air or oxygen passing through the annular space between the outside of the glass tube and the inner surface of the stainless steel tube is partially converted to ozone by a discharge across the annulus. For this conversion the current is increased to about 15,000 V. Manifolds placed at the ends of the ozonator can be employed to distribute the feed gas to the discharge spaces and to collect the ozonised gas. Either oxygen or air feed can be used for the production of ozone. Where tonnage oxygen is available it provides an economical supply. At the same power output about twice as much ozone is generated from oxygen as from air, so that electrical costs and equipment are greatly reduced when oxygen is used. However, in some operations the presence of oxygen in the final product is undesirable—in such cases air feed is likely to be a better choice.

The first important industrial use of ozone was as a germicide for water. More recently its use has been extended for the removal of impurities by means of oxidation. The world's largest ozone plant for the treatment of water is in use at the Belmont water treatment plant in Philadelphia. From 1950 to 1955 an average of more than 10 billion gal. p.a. of pre-settled water from a local river were treated with ozone. The process involved diffusing ozonised air (containing 1·5 p.p.m. ozone) into water at a depth of about 18 ft. while it is in underground contact chambers. At maximum flow the theoretical contact time is about 10 min.

Ozone may be helpful in solving problems associated with waste disposal. Its powerful oxidising properties have been utilised for the destruction of phenols in coke-plant ammonia-still wastes and phenolic effluents from oil refineries. The abatement of industrial odours is another area in which ozone has proved effective. It has been used successfully for the abatement of the odours of sewage and fish in feed and fertiliser plants and for the control of paper-mill and commercial cooking odours.

Anglo-Dutch mammoth

We, like most people, think of Shell primarily as an oil company, so it was with some surprise that we learned that the Group's turnover in chemicals is now around £225 million a year, getting on for half the turnover of such thorough-going chemical giants as I.C.I. But even this huge sum is chicken feed compared with the total sales, which exceeded £2,500 million last year, just about £10,000 per employee, for this astonishing organisation employs a quarter of a million people.

Shell's new status as one of the world's great chemical companies is based, of course, on products like detergents, synthetic glycerine, hydrogen peroxide and acrolein—all produced from petroleum and all made by processes developed by Shell. Plastics, synthetic rubber, insecticides, solvents and many other products go to make up the 3·45 million metric tons of chemical products the Group sold last year.

An article in *The Times* gives a fascinating glimpse of the genesis of Royal Dutch-Shell, which is the largest commercial undertaking outside the United States. It has all been built up since 1890. In the early 1900s the Royal Dutch Petroleum Co. began its partnership with the "Shell" Transport and Trading Co., which then belonged to M. Samuel and Co. Why "Shell"? Simply because the company originally imported all kinds of goods from the mysterious East, including shells for decorating Victorian boxes. A shell became the trade mark; it is now the most famous in the world.

Royal Dutch Petroleum and "Shell" Transport and Trading are now simply holding companies, drawing dividends (60% Royal Dutch and 40% Shell) from the two principal group companies, Bataafse Petroleum (Dutch) and Shell Petroleum

(English), which between them control 500 companies operating in various branches of the oil and chemical industries. This mammoth network is controlled from The Hague, which co-ordinates Europe, and London, which co-ordinates the rest of the world. Broadly speaking The Hague central office deals with technical matters and the London central office with marketing and finance.

Royal Dutch-Shell operates in every political area except the Communist bloc, draws oil from a score of different countries, maintains 35 refineries and operates 551 tankers with a combined tonnage of over 10 million. Last year it produced and processed 125 million metric tons of oil, about 14% of the free world's output.

A right royal smell

We recently sampled the atmosphere of Queen Elizabeth's palace. We were able to do so by courtesy of chemists of the Wellcome Foundation. It happened this way. A recent book about the Virgin Queen mentioned her special perfume. This is a euphemism for what was actually a room fumigant or deodorant which the Queen used copiously to play down the vigorous smells of a sixteenth-century palace (we are indebted to Sidney Rogerson of Wellcome for this delicious phrase). It was reported that Queen Elizabeth the Queen Mother had expressed interest in this incense. This led to enquiries being made at the Wellcome Historical Medical Library, where the ingredients of the incense were uncovered in an Elizabethan medical tome. These ingredients, or their nearest modern equivalents, were procured and blended by chemists of the Wellcome Foundation and a sample was sent to the Queen Mother, who expressed her pleasure at receiving it.

A similar sample was sent to us and we tried it out to see how it compared with push-button deodorants. It consisted of a bottle of " compound water " and a packet of dried herbs. It is slightly less convenient to use than an aerosol spray because you have to place the herbs and compound water in a small vessel and boil softly over a spirit lamp or night light. The result is a full-bodied aroma with notes of thyme, sage, caraway and coriander. It convinced us of its ability to overcome the olfactory consequences of Elizabethan drainage, but room spray makers need have no fear that it would oust their products. It is much too strong for modern tastes.

Readers who might like to experiment with this Elizabethan concoction would have to acquire 3 gallons of red wine or strong ale. Into this would have to be infused:

Bruised anise seeds 22 g., bruised liquorice 22 g., dried fennel and dried thyme 1 level teaspoonful of each, catmint 2 level teaspoonsful and an equal amount of mint, bruised coriander seeds 3 g., bruised caraway seeds 3 g., dried rosemary and dried sage 1 level teaspoonful of each. This is infused in the wine or ale, " then still it in a limbeck with a soft fire." This makes the compound water of which 8 dessertspoonfuls are added to ½ oz. of sweet marjoram and two pennyweights each of powdered benzoin and fine powdered sugar. The whole is " boiled softly on a low fire to perfume a room."

Packaging ingenuity

Two clever Continental ideas for pharmaceutical packaging have been introduced into Britain. John Dale Ltd. are the sole licensees for *Cerbo Stars*, cheap and simple polythene replacements for cotton-wool wadding for bottles and tubes. They are flexible star-shaped mouldings with four or more longer arms that fold up, wedging the device firmly between the cap and the contents. They are made with enough tolerance to suit varying sizes of containers and containers made of different materials. They can be inserted by hand or with special machinery. Not only do they make glass bottles more attractive, but they are non-hygroscopic and, say the makers, will not discolour in sunlight.

The other idea is French. It is a refined version of the sachets of silica gel that are widely used on the Continent to protect pills and tablets against humidity when the container has been opened. Instead of being placed in sachets, the desiccant is contained in plastic stoppers and capsules. A disc permeable to water vapour is fitted to prevent the desiccant touching the contents. *Air-Sec* dehydrant stoppers are made at Choisy-le-Roi, near Paris, by S.A. Air-Sec, who are represented in Britain by Textile Mouldings Ltd., of Accrington. More than 25 types are being made in diameters from 10 to 35 mm. The three main types are snap-caps, capsules and seals. Silica gel dyed cobalt blue can be supplied to indicate by change of colour when the desiccant is becoming spent. The stoppers are made of translucent polythene that enables the colour to be seen.

Super antiseptic?

The Society of Cosmetic Chemists in New York have been told about a new brominated phenolic antiseptic which is said to be better than hexachlorophene, bithionol and the mercurials. It is a 1:3 mixture of 5,4′-dibromosalicylanilide and 3,5,4,′-tribromosalicylanilide. and it is called diaphene. Dr. H. C. Stecker of Stecker Chemicals claimed at the S.C.C. meeting that the mixture is effective at 0·3 to 0·5% as against 1 to 2% for hexachlorophene. It is recommended for soaps, cosmetics and topical pharmaceuticals. It is claimed not to discolour soaps or creams and its stability at high temperatures enables it to be added to soap during crutching. Its pharmacology is interesting. According to Dr. Stecker it reacts with proteins at the surface of the skin, becomes insoluble and won't penetrate below the surface where it might irritate sensitive people. It is effective against Gram-positive bacteria and is also useful against some Gram-negatives and pathogenic fungi. Dr. Stecker's co-worker was Dr. R. E. Faust of Cuticura Laboratories.

The Ashburton Chemical Works Ltd.'s £800,000 extension at Trafford Park, Manchester. The laboratory building (right) and administration building (left) have no opening windows and all air supplied is filtered by electrostatic precipitation. The materials for the exterior of the building were specially chosen to combat corrosion.

New Laboratories for Geigy Subsidiary

ASHBURTON'S SEALED BUILDINGS COST £800,000

The new laboratory and administrative block of the Ashburton Chemical Works Ltd. at Trafford Park, Manchester, was opened on October 14 by the President of the Board of Trade, Mr. Maudling. The present extension marks the completion of a plan whereby the laboratories, administrative and drawing offices and welfare facilities, hitherto scattered, have been concentrated in one group of buildings.

In Britain Geigy have been manufacturing chemicals since 1925, but the acquisition of the 20 acre site in Trafford Park on which Ashburton Chemical Works now stands began only in 1939. Production started in 1940 and since 1945 the size and scope of the works have been extended to keep pace with new developments in the chemical and plastics field. Today Ashburton Chemical Works Ltd. employs nearly 800 people (including 500 operative workers), and the products manufactured include plasticisers and other chemicals for the plastic industry (sebasic acid, sebasic and phthalate esters, aryl phosphates), pigment intermediates, textile chemicals, optical whitening agents, synthetic tans, chemicals for metal and water treatment and pharmaceutical products.

The opening of the new laboratory, drawing office and administrative building marks the completion of a group of buildings on which work began in July 1956. These buildings, occupying 2½ acres, were planned to concentrate in one place offices, analytical and process development laboratories, and welfare facilities which had been inconveniently scattered over the works and which in many cases had become inadequate to the needs of the productive side of the enterprise. The total cost was in the region of £800,000 and the first part to be completed was the welfare building which was ready by May 1958. The laboratory and the administration block was begun early in 1957 and completed early in 1960.

Because of bad air pollution on the site (a steel works lies adjacent amongst other industries), timber framed curtain walling has been used, which is glazed with spandrel panels of Vitroslab to allow easy cleaning. In this way a unit of design has been evolved which forms a distinctive external feature, and costs have been reduced by producing large numbers of such units for use over the whole group of buildings. Metal has not been used externally except for lead flashings, steel runways for window cleaning which are fixed by replaceable hangers, and steel shutter and blast doors which are more easily maintainable at ground level.

So that circulated air should be as free from pollution as possible none of the buildings have opening windows; filtered air is supplied from the ventilation plant rooms on the roofs of the welfare and administration buildings and on the top floor of the laboratory building. The main air filtration is by electrostatic precipitation.

One of the spacious and well-lit analytical laboratories. Glass-fronted cupboards run the length of the wall and the space under the fume cupboards is occupied by drying ovens.

Laboratory building

This five storey building embodies many of the latest ideas in laboratory design and consists of:

Basement. A large general chemical store and main sample store, a work room, an automatic internal telephone room, two dark rooms, storekeepers' rooms and cleaners' stores and a goods store adjoining the goods lift. There is a similar goods store on each floor of the building.

Ground, first, second and third floors. Three laboratories each 42 ft. by 25 ft., ancillary offices for chemists and typists, stock and sample rooms and balance rooms; with a goods receiving bay on the ground floor; instrument and constant temperature room on the first; typists pool and telephone operators' room on the second and a large conference room on the third floor.

Fourth floor. A large ventilation plant room approximately 31 ft. by 35 ft.; noxious processes laboratory 21 ft. by 25 ft.; autoclave room of a similar size, balance room, semi-micro laboratory and ancillary offices for chemists.

Laboratory furnishings

The furniture of all laboratories conforms to a standard module so that the units are interchangeable. The architects are also very conscious of the problems of maintenance, and after much experiment with tiles, fume ducting, piping and so on, provided materials exactly suitable for their purpose.

Each of the main laboratories contains three island benches, the greatest possible length of wall and window benching and two fume cupboards each about 16 ft. long.

The fume cupboards have a maximum amount of glazing and are provided with mechanical stirring gear; the bench tops in them are covered in black ferrolite tiles and all the service controls are contained in a white Formica panel at the front. Coloured tiles behind the fume cupboards provide a contrast to the other white tiled walls.

The island benches have teak tops with reagent racks on stainless steel supports and plastic covered peg racks. The window benches have specially glazed acid resisting tiles. The wall bench is covered with black ferrolite tiles. All bench tiling is bedded and pointed with an acid resisting compound. Under-bench cupboard, drawer and bin units are retractable and are painted in two shades of grey epikote resin paint. Similar retractable units are placed underneath the wall and window bench units and the fume cupboards. Drying cupboards for apparatus and products are placed underneath the fume cupboards and exhaust into them.

Each laboratory contains one large wash-up sink with plastic covered racks for drying apparatus. High level storage cupboards with glass sliding doors are fitted along the whole of one wall in each laboratory. Services are water, steam, gas, electricity, vacuum and compressed air. The service outlets (some 150 in each of the main laboratories) are stove-enamelled in grey Epikote paint with the relevant colour code index in the head of each control.

Ventilation and heating

The air conditioning plant room for the laboratory block is on the fourth floor and comprises a plenum and a ventilation system. Fresh air passes an electrostatic precipitator, air washer, heater and plenum fan

(*Continued on page* 433)

The instrument room in the analytical section. This is specially air conditioned to maintain constant temperature and humidity.

STERILISATION OF MEDICAL PRODUCTS

1. Steam Sterilisation

By G. R. Wilkinson*

In the last decade understanding of sterilisation methods has deepened and techniques have improved. In this article the basic mechanisms of sterilisation are considered and steam sterilisation is dealt with in detail. In a second article, to be published later, Mr. Wilkinson will discuss sterilisation by ethylene oxide gas.

MUCH attention is being focused upon the need for sterility, particularly in hospitals where the incidence of infection has increased over the past few years.

For a number of years patients have been treated under the protective umbrella of antibiotics, but now the number of antibiotic resistant strains is increasing, and because of this sterility of instruments, dressings and other materials is becoming even more important.

Sterilisation is only one aspect of the diffuse problem of cross-infection, but is one which can be most readily dealt with. Sterility is an absolute term, and a product can only be sterile or non-sterile with no intermediate stage, although we still hear occasionally such phrases as " sufficiently sterile " or " almost sterile."

Since articles appeared in these pages some ten years ago, the understanding of certain methods of sterilisation has increased and techniques have improved, although the basic facts remain unchanged. New methods have also appeared and old ones have fallen into disrepute. These articles are addressed particularly to readers who are not familiar with the mechanism of sterilisation, and the underlying principles of some of the procedures used, particularly those connected with heat sterilisation and the use of ethylene oxide.

Mechanism of sterilisation

Bacteria and moulds can exist generally in two forms. The first is the vegetative form, or actively developing organisms, and the second spores, which are the resting phase which some bacteria assume if transferred to a medium which is unsuitable for active growth. All living cells have a complex system of enzyme action and bacteria and spores are no exceptions. These enzymes are a mixture of protein and non-protein units, but generally speaking, since they are at least part protein they can be considered as proteins and shown to possess similar properties. The important property with regard to sterilisation is that they can be coagulated or denatured by heat or other physical means, and any of these treatments which modify any of the essential enzymes in the cellular matter or nucleus produces a break in the life cycle. This means that the cell is unable to reproduce itself and may be considered to be killed.

When considering heat sterilisation, there are two general methods, dry and wet heat. Although it is not essential to consider them separately, it is important to remember that bacteria and spores in particular are more resistant to dry heat than to moist. This was realised as long ago as 1898 by Koch, who pointed out how relatively inefficient dry heat was.

This greater resistance to dry heat appears to originate from the hardening of the outer layers of the bacterial cells by coagulation of the protein, which slows down the rate of heat transfer to the interior of the cells and further coagulation. This can be best demonstrated by considering the coagulation of albumen. When it contains 50% of water, coagulation temperature is 50°C., whereas if it is first made anhydrous by freeze-drying or by some similar method by which the protein is not denatured, it must be heated at 170°C. before coagulation takes place.

Thermal death rate

The achievement of sterility and destruction of bacterial cells by heat, either dry or moist, is gradual, and time and temperature may be related by a curve (Fig. 1). The curve is almost always logarithmic, although it has been shown that the last few spores are sometimes abnormally resistant and take much longer to kill than other spores and bacteria present. The slope of this curve is known as the thermal death rate. It has been calculated that the slope of the curve for most spores per 10°C. increase is between 7 and 10 over the range of 100°-135°C. under wet conditions, and on this basis the equivalent sterilising times range from more than 20 hr. at 100°C. to

Table 1.—Some Quoted Destruction Times of Bacterial Spores by Moist Heat

Organism	*Destruction time (minutes) at:*					
	100°	105°	110°	115°	120°	125°
B. anthracis	2-15	5-10				
B. subtilis	many hours			40		
A putrefactive anaerobe ..	780	170	41	15	5·6	
Cl. tetani	5-15	5-10				
Cl. welchii	5-10	5				
Cl. botulinum ..	300-530	40-120	32-90	10-40	4-20	
Soil bacteria ..	many hours	420	120	15	6	4
Thermophilic bacteria		400	100-300	40-110	11-35	3·9-4·6

Some Quoted Killing Times of Bacterial Spores by Dry Heat

Organism	*Destruction time (minutes) at:*						
	120°	130°	140°	150°	160°	170°	180°
B. anthracis			up to 180	60-120	9-90		3
Cl. botulinum ..	120	60	15-60	25	20-25	10-15	5-10
Cl. welchii	50	15-35	5				
Cl. tetani		20-40	5-15				
Soil spores					30	15-60	

* Research Division, Allen and Hanburys Ltd.

2½ min. at 130°C. Some figures published in the literature are quoted in Table 1. This shows that resistance follows a similar pattern in the case of dry heat, but obviously the temperatures required are much higher. Of the external factors influencing the behaviour of bacteria and spores when exhibited to dry or moist heat conditions, a number have a bearing on sterilising methods used for products normally encountered in hospitals and industry. The most resistant organisms are those found naturally as spores in soil and dust. If these organisms are cultured in vitro and caused to form spores again these spores are usually much less resistant than the original ones. There are various theories on this point, but all that has been established so far is that heat resistance can vary with age and this may be either an increase or decrease in resistance.

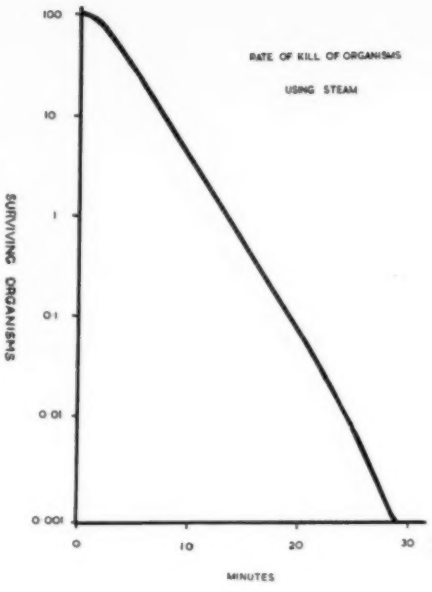


Fig. 1. Thermal death rate curve using steam.

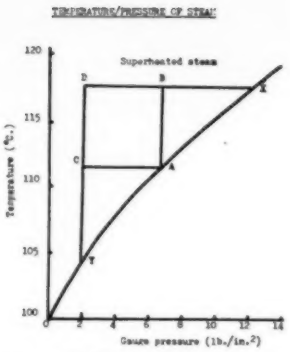


Fig. 2. Temperature/pressure curve for steam showing relation between different types of steam.

Factors affecting thermal death rate

The presence of fat, protein, inorganic salts, and the acidity of alkalinity of the product in which the bacteria are present affect the thermal death rate considerably. In materials high in protein, such as pus and sputum, a protective influence exists, whereas if only inorganic salts are present the *p*H value is the most important feature. Generally any movement of *p*H away from 7 increases the thermal death rate. From the thermal death curve it is clear that if 100,000 organisms per ml. were present instead of say 100, a longer period would be necessary to ensure that all organisms had been killed. It is because of these features that all materials to be sterilised should be produced in a state of more than usual cleanliness. In the case of pharmaceutical products, such as ampoules and transfusion fluids, conditions are achieved which are conducive to the killing of organisms. The number of organisms present are numerically few and organisms of the most resistant types are only present in exceptional cases. Since the products are not heavily contaminated to start with, a short heat treatment is permissible to produce sterility in the product and the periods specified in the British Pharmacopœia are based on the assumption that the product is contaminated with only a small number of organisms before sterilisation takes place. On this basis the time and temperatures specified give a safety margin.

Regarding the temperatures of sterilisation by dry heat, much appears in the literature. The British Pharmacopœia specifies that the temperature of the article undergoing sterilisation must be at least 150°C. for 1 hr., whereas other authorities suggest that 160°C. is a more satisfactory temperature. More recently it has been suggested that 250°C. is advantageous and at this temperature only 2½ min. is required to kill living organisms and spores. At the other end of the scale 100°C. will kill all vegetative organisms in one hour but not spores.

The method of choice for dealing with large quantities of aqueous solutions of thermo-stable substances and dressings is autoclaving. Autoclaving consists of exposing the product under wet conditions to a suitable temperature for a suitable time and this is usually achieved by means of steam in a closed pressure vessel.

Steam

The most recent developments in steam sterilisation are concerned with the quality of the steam in the steriliser and the presence of air in the steam and in the charge. Before these can be considered in detail it is necessary to have some knowledge of steam and its behaviour with particular reference to its use for sterilisation.

Steam is a most reliable source of heat for sterilisation by autoclaving for the following reasons:

1. It has a high heat content for its weight or volume.
2. It gives up its heat at a constant temperature, which may be readily controlled.
3. It can be produced from cheap and plentiful sources and in many instances used steam from some other process can be utilised.
4. It is clean, odourless and tasteless, and presents no hazards of toxicity.
5. It can be readily distributed.
6. It heats objects rapidly and under suitable conditions can be made to penetrate fabrics.
7. Its quality and temperature may be readily controlled.

At any one temperature steam can exist in one of three states and in these states it contains a varying amount of energy in the form of heat.

Wet steam is super-saturated with water in the form of suspended droplets and weight for weight has much less heat content than saturated steam at the same temperature and pressure.

Dry saturated steam is ideal for sterilisation purposes and is water vapour at a temperature equivalent to the boiling point of water at the same pressure without any water droplets present.

The third type of steam is *superheated steam*, which is steam confined and heated in a closed vessel to impart to it extra heat. This is very dry and at any particular pressure is at a higher temperature than saturated steam.

Cooling of superheated steam

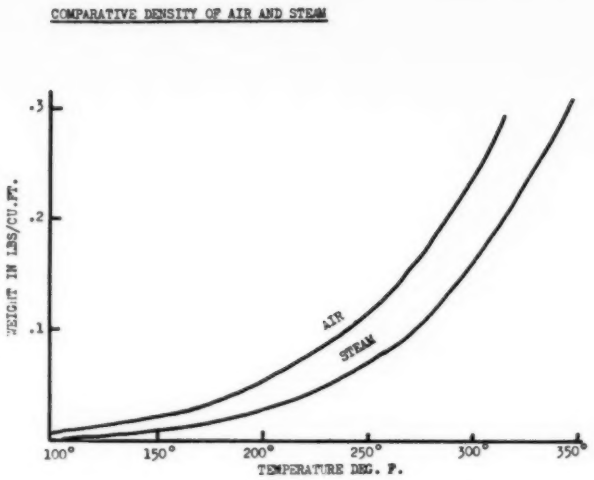


Fig. 3. Comparative density of air and steam at various temperatures.

occurs when it meets the relatively cool surfaces of the steriliser and its contents, and it must first give up its super-heat and cool to the temperature of saturated steam without any change in pressure. It then commences to condense and in so doing gives up latent heat, turning into water at the same temperature, and until it all condenses the pressure remains constant. It is this latent heat which is the most valuable source of heat in a steriliser. If this process is continued more heat is obtained by the water cooling to a lower temperature, but this feature is not used in sterilisers.

Steam pressure/temperature relationships

The relationship between pressure and steam temperature is shown in Fig. 2. Steam at any point on the curve—for instance, at A—is saturated, whereas if its temperature is raised to B, keeping the pressure constant, it becomes superheated. If the pressure is lowered to C, keeping the temperature constant, it is again superheated, and if both events occur—that is raising its temperature and lowering its pressure—it may reach a point such as D. This point can also be reached by reducing the pressure of saturated steam at the point X, or by raising the temperature of saturated steam at the point Y, the final result being exactly the same. This shows how closely temperature and pressure of steam are related, and how one may influence the other.

As far as steam sterilisation is concerned, superheated steam is wasteful because it must cool to saturated steam temperature before the latent heat, which is the major source of energy, can be liberated. Since superheated steam is dry, it behaves as dry heat and therefore requires higher temperatures to achieve sterility. Failures can occur because this is not appreciated. Wet steam not only contains less heat but it can cause the contents of the steriliser to become waterlogged. Furthermore it deposits condensate on to the surfaces being heated and this can be troublesome, as water is a good insulator.

This interchange of superheated, saturated and wet steam can only come about because of the large latent heat of vaporisation of water, and the total energy in the steam remains constant. For instance, if saturated steam is passed through a reducing valve so that the pressure is reduced from 60 p.s.i. to 15 p.s.i., the temperature of steam issuing would be 286°F. instead of the normal 250°F. Therefore if wet steam were passed through a similar reducing valve it is possible for dry saturated steam at a lower pressure to become available. As an example, reducing wet steam with about 2% of water present from 100 p.s.i. to 30 p.s.i. dry saturated steam will be produced. Unfortunately, steam is more likely to contain something like 10 to 20% of water, so this reducing valve trick has no wide practical application unless the change in pressure is considerable.

Steam contaminated by air

Another feature which must be considered is the presence of air in the steam. Air can originate from the boilers and also is present in the chamber before steam is admitted. The presence of air affects the temperature of saturated steam at a particular pressure. Dalton's Law postulates that in a mixture of air and steam the two gases will share the total pressure in proportion to the volumes of the two gases. The table gives an indication of the effect it has on temperature. For instance, 20 p.s.i. which should be equivalent to 259°F., produces in fact only 239°F. if 30% of air is present.

As far as removal of air from sterilising chambers is concerned, it is fortunate that air is denser than steam (Fig. 3), and under the conditions of sterilisation the air travels to the bottom of the sterilising chamber and can be eliminated by means of a suitable steam trap. Much has been written concerning intimate mixtures of air and steam and their elimination by steam traps, but sterilisers are a special case.

Normally air in admixture with steam would remain in "suspension" due to molecular agitation, but in sterilisers this is not the case. Since condensation is taking place within the steriliser the phase relationship is constantly upset and steam is changing to water, which occupies relatively little volume and so the air is "liberated." Due to its greater density it collects at the bottom of the steriliser.

Steam distribution

Main steam distribution is one of the biggest problems which exists as far as steam sterilisers are concerned in hospitals and industry, and considerable care must be taken to ensure that steam reaching the steriliser is saturated but not wet.

For example, if an area is fed by 450 ft. of 4 in. pipe, which is properly lagged with 1½ in. lagging, and the steam pressure is 60 p.s.i., due to heat loss from the pipe alone, about 5½ gal./hr. of water is produced. It is essential that adequate drainage is provided for this water, otherwise it becomes suspended in the steam and makes it wet. Suitable traps and separators can be included and these must be considered during installation. For the sake of completeness, although it is rarely employed in practice, superheated steam can be saturated by introducing water into it by means of commercially available equipment. It is commonly accepted that the maximum degree of superheat which can be tolerated is 5°C., as compared with saturated steam temperature at the same

pressure, and possibly up to 5% of air is permissible also.

Once steam has condensed and is converted into water it must be removed from the steriliser.

Steam traps

To eliminate this condensate a steam trap is necessary. This functions automatically, allowing water to pass out, but closing when only steam is present, procedures which would otherwise need constant manual control if the steriliser were to be kept free from condensate and steam not wasted. Steam traps should perform the following operation:

1. Vent air in the early stages of the sterilisation cycle and rapidly allow the chamber to become air-free.
2. Allow condensate and any further air to be removed from the steriliser.
3. To maintain steam within the steriliser.

These work in two different ways. Some types distinguish between steam and water on the basis of their densities and are generally known as mechanical traps, and those which distinguish by means of temperature, the thermostatic or expansion traps.

The trap must be capable of discharging air, otherwise it is of no value for sterilisers, particularly as in the initial stages of the cycle, when the chamber is being purged, there is a large amount of air to be removed.

The commonest mechanical type is the float trap (Fig. 4). Once sufficient water collects to make the float rise the valve opens and allows water to escape until the float sinks, shutting the valve and stopping the escape of steam. This continues as long as water is being produced. This type has the disadvantage that it will not vent air.

The thermostatic expansion type has an active element in the form of a bimetallic strip or a capsule. One balanced pressure type, which is commonly in use, shown in Fig. 5, contains a capsule or bellows filled with a mixture of water and alcohol which boils at a temperature lower than water. When the element is heated the liquid inside boils and partly vaporises, so producing pressure and expanding the capsule and closing the valve. If the temperature falls, due to the presence of water or air in the condensate line, as this is always somewhat cooler than the

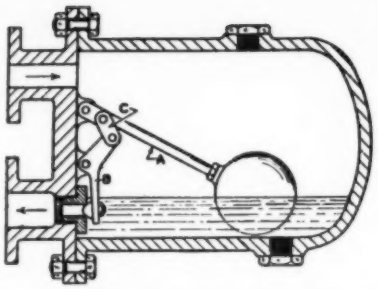


Fig. 4. The float trap, the commonest type of mechanical steam trap.

steam due to the radiation cooling effect in the pipe connecting it to the steriliser, the bellows contract, open the valve and remain so until the water and air have been removed, when they again become heated and close the valve. The advantage of this type of trap for sterilisers is that they can be made to operate with a differential of only a few degrees over the wide range of temperatures used, and they are not subject to changes in pressure unless these are considerable. They suffer from a disadvantage, however, that once shut they will not vent small amounts of air, but this can be overcome by by-passing them with a very small hole so that there is a constant flow of steam which sweeps any small amounts of air.

Steam sterilisers

Some of the more important features of steam with regard to its use for sterilisers have been discussed and it is now possible to consider more closely steam sterilisers themselves. The basic requirements for steam sterilisers using steam under pressure as a sterilising agent are:

1. A chamber for the materials undergoing sterilisation.

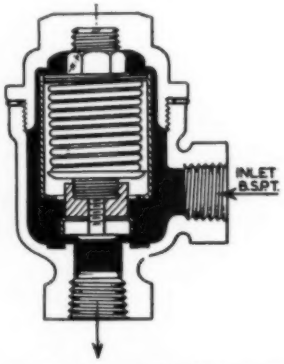


Fig. 5. The thermostatic expansion type of steam trap.

2. Means of removing air and condensate.
3. A source of good quality steam at a suitable pressure.
4. Means of ensuring the whole of the charge reaches sterilising temperature.
5. A system by which dry fabrics may be produced when sterilisers are used for sterilising gowns, dressings, etc.
6. The operation to be capable of being carried out by semi-skilled personnel.

Fig. 6 shows a schematic arrangement of a typical steriliser.

Sterilisers are operated using one or other of two types of cycle. In one air is removed by making use of the difference in density between air and steam, which was mentioned earlier, and in this procedure, known as *downward displacement*, steam is introduced into the top of the chamber and air is displaced through a suitable vent and steam trap in its base. Often in older sterilisers the air vent is fitted at a high level and this renders it almost useless. Using this system of downward displacement it is vital to employ a steam trap which will pass both condensate and air. This type of operation is still largely used for bottles, ampoules, instruments, etc., but is being displaced for dressings by the high pre-vacuum method.

Applying what was said previously concerning the temperature of steam mixed with air, it is possible to determine the actual steam temperature when various proportions of air are present. Table 2 gives the temperature obtained when air is present at the usual sterilising temperatures. These figures show how important it is that air should be eliminated, particularly if a pressure gauge is used to indicate the temperature.

By using steam traps of different efficiencies the conditions within the chamber can be varied and the differences between the top and bottom of the chamber can be considerable. The curves in Fig. 7 are typical of this operation even for an empty chamber fitted with an inefficient steam trap. As a result of this work it is clear that if a thermometer is placed in the drain of the steriliser it indicates the lowest temperature within the chamber and gives a good indication of when air has been expelled; this is particularly true when a slight by-pass is allowed round the steam trap so that a flow

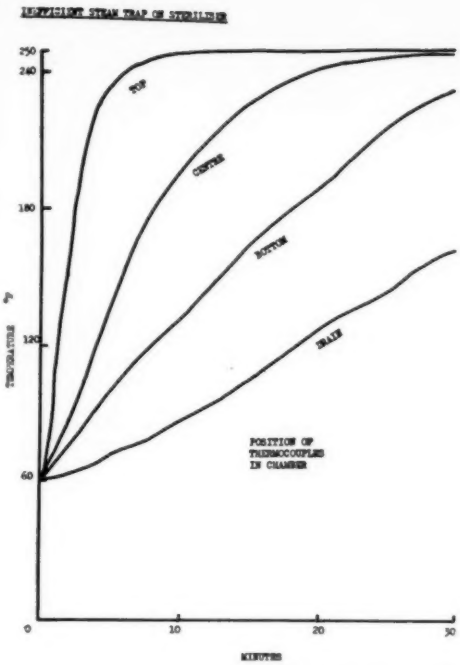


Fig. 7. Curves showing the variations in temperature caused by using an inefficient steriliser.

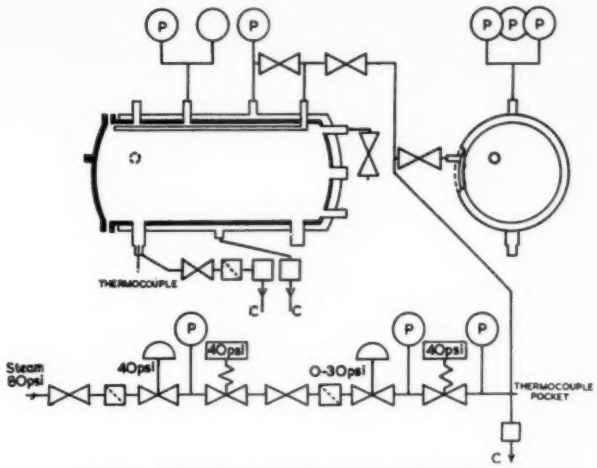


Fig. 6. Schematic arrangement of a typical steam steriliser.

Table 2.—Pressure of Air in Steam

Temperatures °F. of saturated steam mixed with air of per cent. by volume

Steam pressure	0%	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%
Atmos.	212	209	207	201	195	187	179	169	157	141	115
10 p.s.i.g.	239	237	234	227	220	212	203	193	179	162	134
20 p.s.i.g.	259	256	253	246	239	230	221	209	195	177	147
30 p.s.i.g.	274	271	268	261	253	244	234	222	207	188	158

of steam is always present in the drain.

This method, with particular reference to the behaviour of various commercially available steam traps, was examined critically and the results have been published. It was demonstrated how a steam trap could be modified so as to produce one which was satisfactory for this particular application. To sum up, this method of operation is perfectly satisfactory for fluids and solid objects, but because of the difficulties experienced in eliminating air it is difficult to use for dressings.

For dressings the assembly is similar to that shown in Fig. 6, but additionally a means of evacuating the chamber is provided. This pre-vacuum to remove the air is produced by either a steam or water ejector or a mechanical vacuum pump. Using a single-stage steam ejector only a relatively low degree of vacuum can be produced, and although this improves conditions proportional to the amount of vacuum produced, this does not remove sufficient air from the interstices of fabrics to allow rapid penetration of the steam.

Vacuum pumps

The new development is the use of vacuum pumps capable of producing a vacuum of the order of 15 mm. absolute. At least 95% of the air can be removed from the steriliser and permits rapid penetration of steam to the centre of the charge and a very much shorter sterilising cycle. This is illustrated in Fig. 8.

Using a vacuum pump produces a series of difficulties in the design of sterilisers and much work has gone into producing satisfactory equipment. For instance, valves which are capable of withstanding air or steam pressure in one direction may not withstand vacuum in the opposite direction, and gaskets which are steam tight leak hopelessly when subjected to high vacuum.

Pumps are in themselves difficult to operate under the hot, wet conditions experienced in autoclave operation. If an oil-sealed pump is used it is necessary to operate it with an efficient condenser between it and the autoclave, and even then the oil becomes wet and air ballasting must be used to free the oil from water. This can be a protracted procedure.

Steam ejectors can be used, but again a two- or three-stage ejector is required to obtain a suitable vacuum and these, if of the condensing type, must be fitted at least 25 ft. above the ground so as to have a hydrostatic leg as seal between the stages. They also use considerable quantities of steam.

Water ejectors are a possibility, but a very high-pressure water supply is required.

Water sealed pumps fitted with air ejectors to increase their efficiency are suitable and these produce a vacuum of the order of the vapour pressure of water and, since they run in water, moisture and condensate present no problem and a condenser is not required.

Where high vacuum is used, although air is removed, this is not the only reason for rapid attainment of steam temperature within the chamber. The low pressure keeps the contents of the chamber below the vapour pressure of water until the steam has penetrated to the centre of the dressings—which it does rapidly. When the pressure rises condensation, and therefore heating, takes place throughout the charge as soon as the vapour pressure is exceeded.

It is essential for the dressings to be dried after sterilisation, and means are provided for drying them before removal. This consists of removing the water vapour in a current of air drawn through the steriliser, with or

without the application of a vacuum to remove a large proportion of the condensed water. This brings further difficulties, as the air entering the chamber must be sterile. Various types of filter are employed for this purpose and, properly designed and used, a high degree of efficiency can be obtained.

Controlling the sterilising cycle

The simplest means of controlling the sterilising cycle is for an operator to read the thermometers and pressure gauge, and turn the appropriate valves at the appropriate times, an operation which I have sometimes heard referred to as " driving a steriliser," but the personal error is always present. This is usually satisfactory with sterilisers using the downward displacement cycle, but with the introduction of much shorter periods at higher temperatures the movement is towards a fully automatic cycle so that the personal element, except for loading, unloading and pressing a button to start the steriliser cycle, is removed.

The use of short periods at a high temperature means that any variation can have a serious effect on the effectiveness of the cycle. If the steam pressure drops, the time/temperature relationship will be upset. To overcome this problem an integrator is included in the controller so that the " dose " of heat in terms of time and temperature is constant. If the temperature falls the time is prolonged and *vice versa*. Fig. 9 shows the curve along which the integrator functions together with its limiting temperatures. It does not operate until a minimum sterilising temperature has been reached.

The most difficult task is to ensure that the whole of the charge is exposed for an adequate time to an adequate temperature to bring about sterilisation, and since the drain temperature is generally the lowest in the steriliser a sensitive element in this position is normally used for controlling the operation, but the only absolute method is to have a sensitive element at the very centre of the charge, and obviously since this is usually impracticable the aforementioned compromise is generally accepted.

Automatic sterilisers

The most recent steriliser design incorporating these features is the jacketed steam heated autoclave with press-button control to select the particular cycle required for dressings and gowns, instruments and utensils, rubber gloves and solutions, and is shown in Fig. 10.

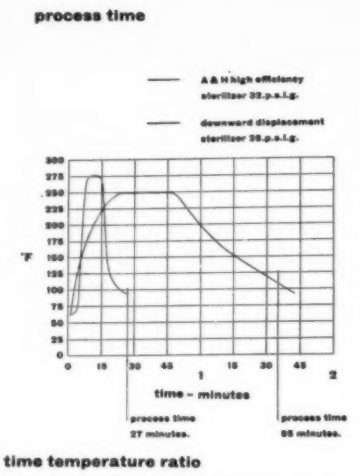


Fig. 8. The graph illustrates the shorter sterilising cycle required when using a high vacuum.

The body is constructed to B.S.S. 3220:1960 of welded mild steel plate, and the chamber may be lined with stainless steel sheet. The chamber has a door at either one or both ends. The door is locked in position by radial arms engaging into slots provided in the extended jacket and a safety lock is incorporated in the door operating mechanism to prevent the door being unlocked while there is a pressure greater than 1·5 p.s.i.g. between the chamber and atmosphere.

Mounted on a panel alongside the door are the instruments and the buttons for operating the mechanism controlling the cycles of operation.

The automatic control system provides for the following cycles:

(*a*) Dressings and clothing, 275°F.
(*b*) Instruments and utensils, 275°F.
(*c*) Gloves and rubber goods, 250°F.
(*d*) Solutions, 250°F.

In each case the time and temperature are integrated so that the charge receives equivalent sterilising exposure even if fluctuations in steam pressure and temperature occur.

The sterilising exposures vary between 3 min. at 275°F. and 15 min. at 250°F., and the timing mechanism is so arranged that it does not start operating until 250°F. is attained; safety devices will not allow the temperature to exceed 275°F. even if the steam supply temperature is greater than this.

Automatically, the system shuts down immediately there is any failure in any of the services, including the vacuum pump.

Initially the chamber is exhausted before the admission of steam, and after the sterilising period for dressings, etc., a vacuum is again produced. When necessary the jacket is heated.

In the case of the sterilisation of bottles, etc., provision is made in the cycle for the gradual reduction of pressure after the sterilising period.

Should there be any reason to open the steriliser before the expiry of the cycle, an emergency stop button is arranged to vent the chamber to atmosphere and reset the automatic control to the starting position and at the same time indicate the chamber contents as non-sterile.

The use of a steriliser of this type removes many of the troubles which can occur due to faulty operation of the steriliser.

Dry heat sterilisation

Dry heat sterilisation has its uses and is applicable to objects such as glassware, bottles, forceps and so on, which are in no way damaged by high temperatures. It can also be used for materials such as powders, oils, etc., which cannot be sterilised in the presence of moisture. Until recently the only apparatus used were hot-air ovens, but these tend to be unreliable, as the temperature within them can differ by as much as 10° from one point to another. To overcome these difficulties use is being made of infra-red radiant heat.

Sterilisation of syringes

With regard to syringes which have customarily been sterilised in hot-air ovens, equipment has been produced where syringes are loaded

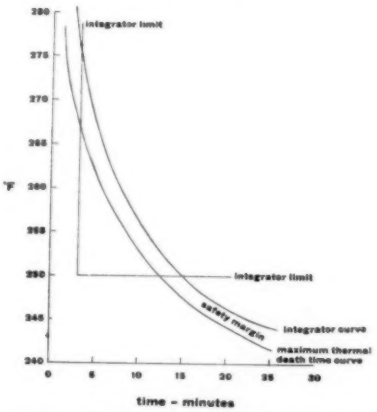


Fig. 9. The curve shows the points at which the integrator functions.

into sealed aluminium tubes and these may be considered as separate small ovens. The tubes are loaded on to a moving belt which carries them slowly through the chamber under a series of infra-red heaters. These bring the temperature of the containers and their contents to sterilising temperature, and the speed of the belt is so adjusted that they are maintained at the necessary temperature for a suitable period. For a small scale use of this procedure a hot-plate is used where holes have been drilled to accommodate the aluminium tubes, and again under these conditions satisfactory control of rates of heating and sterilising procedures can be achieved.

Articles of different sizes moving at a constant rate under radiation may be given different amounts of heat treatment by using containers of different colours and surface finish as well as dimensions. A dull black surface heats quite readily, whereas a light-coloured polished surface heats slowly.

For instruments, infra-red vacuum ovens have been developed where the air is removed to prevent oxidation before the heating is applied and the chamber is equilibrated after the cycle with carbon dioxide or nitrogen, which not only assists cooling but prevents oxidation of the articles during this part of the cycle. It has been found very necessary to have a high degree of cleanliness for syringes, instruments and the like, for if they are dirty it is possible to isolate spores which will subsequently germinate when transferred to suitable conditions.

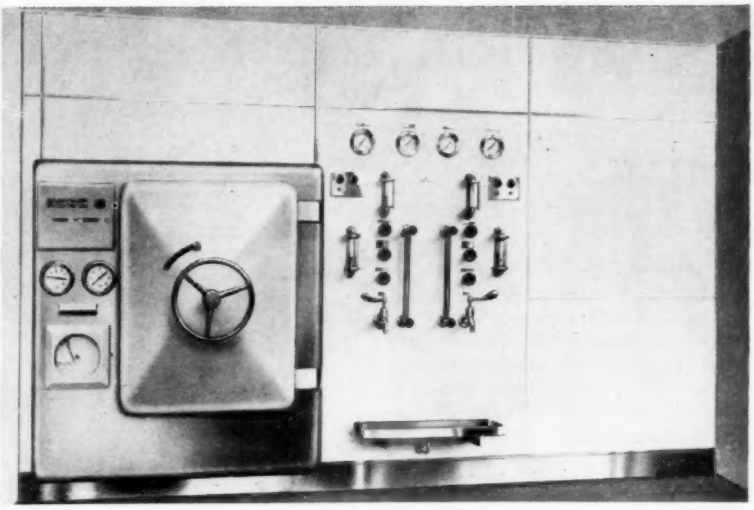


Fig. 10. A modern jacketed steam heated autoclave with press-button control made by Allen and Hanburys Ltd.

NEW LABORATORIES FOR GEIGY SUBSIDIARY

(*Continued from page* 426)

and is then distributed through a system of ducts above the corridor ceilings into the rooms through diffusing grills. Air is extracted from all rooms of the laboratory block, that from the offices being partially recirculated during winter and that from the laboratories being exhausted to outside atmosphere by means of PVC extract ducting fitted in each fume cupboard and extract fans housed on the flat roof. There is a small air conditioning plant by the instrument room where constant temperature and humidity have to be maintained at all seasons. The laboratories are heated by convectors incorporated in the window benches, the offices by wall radiators and staircases by radiant ceiling panels at the main landings.

Along the whole length of the corridors of the laboratory block there is a duct accommodating rising services tubing and PVC extract ducting. The services comprise low and high pressure steam, condense, cold and hot water, gas, compressed air, mains electricity and telephone services and separate fire fighting water systems.

An emergency shower for the protection of personnel is provided in each corridor near the laboratories.

Administrative building

This building includes offices, stores, conference rooms, library and drawing offices. In the basement is the calorifier room. This room accommodates the heating and hot water storage calorifier and all necessary pumps. All heating and ventilating is controlled automatically in the buildings. The ventilating plant is similar to that in the laboratory block.

Mancuna Engineering Ltd., an associate of Sturtevant Engineering Co. Ltd., were responsible to J. Gerrard and Sons Ltd., the main contractor for the provision of all heating, ventilating and fume extraction, in accordance with the instructions of the consulting engineer, John Porges.

The equipment supplied included air washers, *Precipitron* electrostatic air filters, all the necessary duct work, diffusers, fans and motors. All the fume extraction systems are made in PVC and incorporate PVC fans.

Electrical installation

The electrical installation for both the laboratory and administration buildings consists of a main substation with a switch fuse controlling each floor in each building. From this substation VRI cables are taken in conduits and trunking through the basement to two vertical ducts, one in each block, dividing to a main switch fuse at each floor level. From this point conduits are taken from a multi-way distribution board to all services, both three phase and single phase, in false ceilings, and through concrete floors. Generally, fluorescent lighting is used in laboratories and offices.

Fire alarms

Fire alarm push-buttons are placed at all landing levels and the operation of one automatically energises all sirens in the block, operates a remote alarm at the central enunciator panel in the works and starts a booster pump on the water supply to work the fire hoses.

NEW FOR THE Laboratory

Instruments, Apparatus, Equipment and Furniture

Furniture, Fittings and Equipment

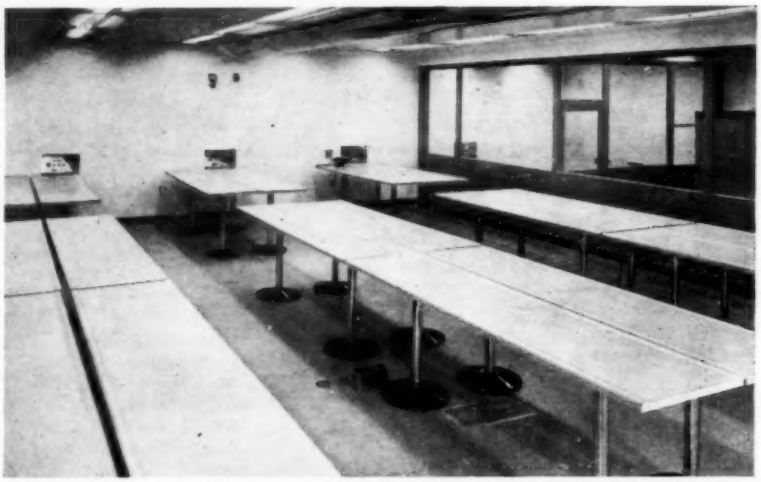
The Gallenkamp-Towers organisation has published the 14th edition of its catalogue for distribution on a world-wide basis. This 960-page publication contains both Gallenkamp and Towers specialities and the scope of general equipment has been greatly increased from previous editions.

Laboratory furniture and fittings. Included is the full range of newly-styled laboratory furniture and fittings. Three ranges are available, one in oak for general purposes, another in mahogany where economy is a major consideration, and a third in aluminium. The metal furniture is fire resistant and suitable for tropical climates while being attractive for any laboratory. (Publication 592A.)

Electric furnaces. The Gallenkamp range has been re-designed and new types have been added. In several cases it has been possible to increase the maximum operating temperature by incorporating safety devices. Furnaces are self-contained where practicable, with all controls and accessories necessary for efficient operation built into non-corroding asbestolite cases. Automatic control is either fitted as standard or available as an alternative to manual control. Nearly every furnace has a temperature fuse to prevent damage by accidental overheating.

An important innovation is a range of furnaces which can operate continuously at 1,500°C. with an oxidising atmosphere. These furnaces are heated by low voltage hairpin elements which are supplied from a fully automatic transformer. (Publication 620.)

Membrane filter. A convenient and efficient filter holder for use with oxide membranes is available. This filter has a quick-sealing clamping ring and an aluminium funnel with approximate capacity marks at 50 and 100 ml. A 500 ml. funnel and an attachment for positive pressure filtration can be supplied. (Publication 594A.)



This laboratory in the new £150,000 extension to Ferranti's Pilton factory, near Edinburgh, must be free of all dust particles greater than half a micron. This degree of cleanliness is for work on inertia guidance systems for aircraft, submarines and missiles. Extreme precautions are taken with personnel and equipment entering the room. Special hard-wearing laboratory benches have been supplied by Graceline Units Ltd., having a jointless and edgless panel to avoid the collection of dust and with humped edges back and front to prevent objects rolling on to the floor. The benches are surfaced with laminated plastic curved by a new process.

Photoelectric colorimeter. This is a rapid acting direct reading instrument with a response of about 3 sec. It has one knob operation, a three-position sample holder and incorporates a centre-pole moving coil meter which is sensitive yet robust. Accurate readings may be taken on the 5 in. scale which is calibrated directly in extinction (E). (Publication 603.)

Automatic adiabatic bomb calorimeter. Automation in bomb calorimetry has made a step forward with this new bomb calorimeter. It is claimed that determinations can be made in as little as one-third of the usual time. It saves drudgery as the operator need not be chained to a thermometer. It saves calculations because cooling corrections are eliminated, and it reduces errors to a minimum because of highly accurate automatic temperature control. The control system uses two matched hermistors, one sensing the temperature of the bomb and the other of the water-jacket enclosure. Their resistance is continuously compared on a low voltage a.c. bridge. Out-of-balance in the bridge is amplified and then used to control instantaneous heaters in the water-jacket to equalise temperature. The water-jacket completely surrounds the calorimeter system, thus determinations are independent of ambient conditions. (Publication 395A.)

Spectrophotometer

A new infra-red spectrophotometer will be marketed by Unicam Instruments Ltd., in January or February. Costing £1,350, it is claimed to be the lowest priced instrument of its class.

The *SP.200* is a double-beam instrument designed for routine analysis. The dispersing element is a rocksalt prism, and the complete range of the instrument, 650 cm^{-1}-5,000 cm^{-1} (15·4 μ-2 μ) is covered in a single 10-minute scan.

The source is a large air-cooled, Nernst filament. The photometer is of the null type, and uses an optical

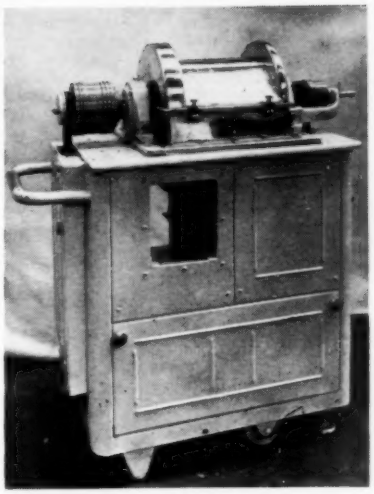
wedge to give a linear transmission scale. The slits are programmed to give a constant energy background the level of which can be adjusted, and are driven by a lever and cam mechanism. The instrument records percentage transmission vs. a linear wavenumber scale, using a flat-bed recorder. Overall chart size is 32·5 cm. × 20·4 cm., and ruled area 28 cm. × 15 cm. The instrument is simple to operate and particular care has been taken to keep the operating controls to a minimum. The sample compartment is open at the top and front for ease of access.

Research and Experimental Centrifuge

The *612 Dynocone* is a continuous centrifugal machine of British design and manufacture in which the wall of the retaining vessel for the dewatered solids is imperforate. It is said to be the only machine of its type in which the speed of the solids discharge conveyor relative to the shell can be varied by a simple change of driving pulleys, and in which the loading of the machine is positively indicated by the power generated by an electric motor.

It consists of a horizontal revolving shell or bowl inside which a screw conveyor revolves in the same sense at a slightly higher speed. Slurry is fed into the machine through the centre tube of the conveyor and the solids, settling on the bowl surface, are conveyed towards the smaller end of the bowl and discharged. On reaching a predetermined level

The *A1650*, a compact manual polarograph from Southern Instruments Ltd.



Stainless steel centrifuge for laboratory and pilot scale work—the *612 Dynocone* by Riley (IC) Products Ltd.

the liquid overflows through ports at the larger end of the bowl. After leaving the liquid, and before discharge, solids may be washed by means of jets positioned in this zone.

The bowl of the Dynocone is belt driven by a main motor. The screw conveyor is carried on the output shaft of a planetary gear box rotating with the bowl, and the input shaft of this box is belt-coupled to another smaller motor. This arrangement permits control of relative speeds between bowl and conveyor, as well as variability of bowl speed.

Torque developed by solids removal is clearly indicated by measurement of the current generated in the control motor circuit. An overload release in this circuit is so set that, should abnormal frictional resistance develop between the bowl and the conveyor during solids discharge, the control motor is tripped and the load immediately removed, since on open circuit relative movement between bowl and conveyor ceases.

In addition to laboratory use, the *612 Dynocone* may be used as a continuously rated pilot plant. It has the same variability of bowl speed and the same flexibility of control of differential between bowl and conveyor speeds as the larger machines, thus production scale operations can be exactly simulated.

All normal slurries can be handled at the rate of $\frac{1}{2}$ gal. to 1 gal. per min., though in exceptional circumstances this throughput may be exceeded. The maximum size of particles is governed by the cross-sectional area of the feed pipe (which is $\frac{3}{4}$ in. I.D. and in which is run a $\frac{3}{16}$ O.D. wash tube) and by the rate of throughput. The method of feeding is immaterial, provided the feed rate can be closely controlled, and a uniform flow, with the avoidance of surges can be maintained.

For laboratory work, feeding is usually by gravity with metered orifice and, for example, an easily controlled feed for brief tests can be arranged by using an inverted Winchester flask for the slurry. The Dynocone may be pump fed, but care must be taken to ensure that the system and equipment are suitable for the purpose, particulary when abrasives are present in the slurry.

Further details are available from Riley (IC) Products Ltd.

Polarographs

Southern Instruments Ltd. supply two polarographs.

The *A1655 Pulse Polarograph* has advantages over square wave polarography both in sensitivity and resolution. To obtain a normal polarogram the cell voltage is held for most of the time at a fixed value, but at a predetermined time in the life of each mercury drop it is changed by a polarising pulse of $\frac{1}{25}$ sec. to a value that gradually becomes more negative as time progresses. Electronic circuits measure the change in diffusion current produced by each pulse during the second half of the pulse life. Reversible and irreversible reduced ions can be detected at concentrations down to 10^{-7}M. With the derivative circuit concentrations down to 10^{-8} can be detected.

The *A1650 Manual Polarograph* is a compact instrument said to be extremely easy to operate. The "click-stop" method of voltage control by exact increments of 100 mV or 10 mV gives this polarograph a speed of operation comparable to recording polarographs and a complete polarogram of a solution containing several ions can be plotted in 3 or 4 minutes. In routine analysis this operation may only take a few seconds. The sensitivity is only limited by the sensitivity of the galvanometer and the one supplied has a sensitivity of 100mm. of scale for 1 μA, which allows the determination of most metallic ions in concentrations of p.p.m. This low-priced instrument is also ideal for teaching the principles of polarography.

Electrochemical Measuring Apparatus

Cambridge Instrument Co. Ltd. have introduced a new pocket *p*H meter.

It is powered by dry-cell batteries with a life of approximately 1,000 hr. and covers the full scale from 0-14 *p*H. Its scale is subdivided into 0·2 *p*H and accuracy is within $\pm$ 0·1 *p*H. It has a concentric, self-contained glass electrode system, and isolated *p*H measurements are a simple, 3 min. operation. When a variety of processes must be constantly checked, it gives consistently accurate readings. It is ideal for pH measurements and electro-titrations made distantly from mains power supplies, or for use by technicians who must make tests at widely separated points. The meter weighs only $2\frac{3}{4}$ lb. and can be supplied with a shoulder-strap carrying case having extra compartment for the electrode and buffer solutions.

The *Cambridge general purpose polarograph* combines the advantages of several previous types of Cambridge polarograph. It can be purchased in a simple form at modest cost and, by adding auxiliary apparatus (some of which the user may already possess), it can be made to operate as an accurate penwriting instrument with similar facilities to those of the Cambridge direct-writing polarograph. All standard accessories can be used with it, including the Cambridge Univector unit. It is suitable for use with dropping-mercury or other electrode systems.

Cambridge polarograph accessories include:

(1) Polarograph electrode stand, consisting of base, mercury reservoir, capillary tube and flexible connection, cell holder and associated glasswork.
(2) Thermostat. For use when very high accuracy is required. The cell is contained in the thermostat unit, which keeps solution at constant temperature.
(3) External reference electrode. For the absolute measurement of potential an external reference electrode is necessary and is available either for use on the stand or in the thermostat.
(4) Univector Unit which increases the sensitivities of Cambridge polarographs by up to 20 times. It may used with either the direct-writing or general purpose types.

The *Red-Rod* radiant immersion heater inserted in a multiple neck flask; makers Electrothermal Engineering Ltd.

Immersion Heaters

A new range of radiant immersion heaters—the *Red-Rod* series BD—has been marketed by Electrothermal Engineering Ltd. The advantages of the new heaters derive from a special construction employing quartz. The quartz sheath is easily cleaned and is immune to attack by almost all chemical solutions. Infra-red radiation passes through quartz with little absorption so that a large proportion of heat is transferred to the liquid by radiation. The heater is unaffected by violent thermal shock. It is supplied in three wattages, 300, 400 and 500, with voltages of 100-120, 200-220 and 230-250.

The Electrothermal range also includes:

Heating mantles M series incorporating a flexible heating element which is aluminium housed and available for flask capacities from 50 to 200,000 ml.

Flexible heating mantles MJ series which enable flat or round-bottomed flasks of wide tolerance to be used with the same size mantle. These mantles are available for flask capacities 50 to 10,000 ml. and they can be supplied with bottom or side outlets as required.

Electric melting point apparatus IA series providing reproducible results of a known and constant accuracy.

Glass tube cutter IC series for cutting hard or soft glass up to 3 in. diameter.

Heating tapes HT series which has been extended to give temperatures up to 1,000°C. with surface loadings up to 8W/sq. in.

Thermocord HC series which has also been extended to give temperatures up to 1,000°C. with surface loadings up to 43W/sq. in.

"Flexible Furnace" HR series capable of temperatures up to 1,000°C. with surface loadings up to 50W/sq. in. This is for the construction of a high temperature set-up or for portable furnaces.

Laboratory Electro-Separator

The Sturtevant laboratory high voltage separator, type O.H., has been specially designed for use in laboratories, research organisations, technical colleges, etc. It includes many new features and improvements.

Samples of any quantity, ranging from a few grams to 100 lb., can be treated. While being especially suitable for mineral separation, it is applicable to many other materials. The substances to be separated should be dry and of a size range between 10 mesh and 200 mesh. In some cases the separator may be used in a pilot scale plant.

The machine is mounted on a mild steel frame at a convenient height so that the fractions resulting from separation can be collected in suitable receptacles and the whole operation can be controlled and viewed at the most convenient height.

Included within this frame is the high tension generator. The separator, therefore, can be installed, without any special preparations in any place where there is a good level floor and a single phase, 50 cycle, 230/250 volt electricity supply. It is usual to simply connect a suitable plug to the end of the L.T. cable and plug this into the appropriate socket.

The materials to be separated are placed in the hopper in the top of the machine and are fed on to a carrier roll at a controlled rate, adjustable, to suit the separation of the minerals or ores at the time.

The carrier roll is also rotated at the most convenient and efficient speed and a revolution indicator shows the speed clearly.

Beneath the roll there are two adjustable splitters to divide the

(*Continued on page* 438)

Laboratory Waste Systems in Borosilicate Glass

By J. R. Barrett and R. B. Curry*

THE material selected for the waste systems in new laboratories will depend on the nature of the waste chemicals. The designer of works laboratories can usually be given a complete list of chemicals likely to be used, and by considering these and initial costs, layout flexibility and maintenance he can choose the most suitable material for any particular laboratory. In research laboratories, however, this information is not available because the complete scope of the work cannot be foreseen, and even if such a list was issued it would be dangerous to assume that no other acids, alkalis or solvents would ever be used. The designer can either install a system based on known use of chemicals and accept its limitations, or use the material least likely to be affected by chemical effluents; in our opinion this would be borosilicate glass.

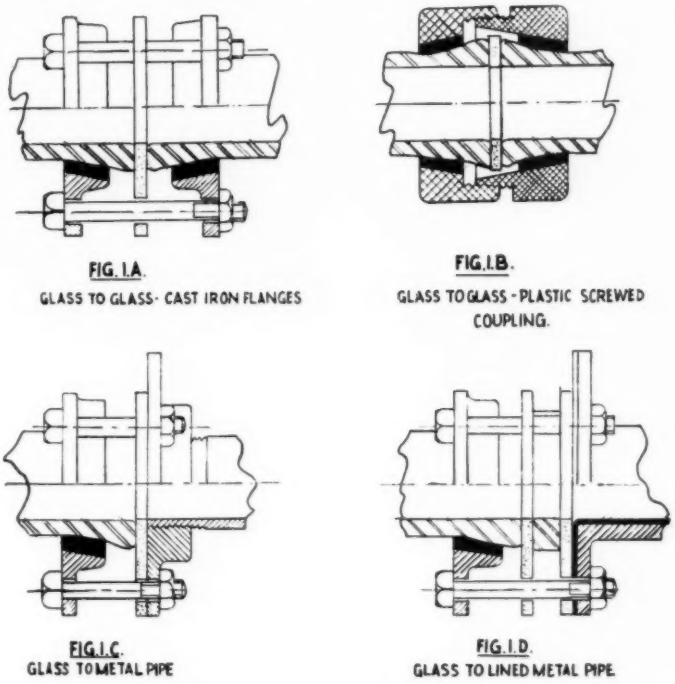


FIG. 1.A. GLASS TO GLASS - CAST IRON FLANGES

FIG. 1.B. GLASS TO GLASS - PLASTIC SCREWED COUPLING.

FIG. 1.C. GLASS TO METAL PIPE

FIG. 1.D. GLASS TO LINED METAL PIPE

For connecting glass pipes, cast iron flanges with tee bolts or screwed plastic couplings can be used (A and B). Special fitted metal flanges may be used for glass to metal pipes (C) and glass adaptor rings if the non-glass pipe is lined (D).

Advantages of borosilicate glass waste systems

1. Carriage of hot corrosive liquids without trouble; the glass withstands a high degree of thermal shock and the only chemicals considered by the manufacturers to have a serious effect are hot concentrated phosphoric acid and hydrofluoric acid, and these are rarely used.
2. Smooth internal surfaces which prevent build-up of solids from effluent containing suspended material.
3. Good transparency which facilitates inspection.
4. Easy dismantling and reassembly.

Design and layout

In designing laboratories with waste systems other than glass, benches and sinks are usually laid out on drawings and the number of waste fittings required are estimated. Straight sections of pipe are delivered in long lengths and cut to suit site requirements.

A different approach is necessary with glass because it is rigid, and cutting on the site is undesirable because of the particular design of tapered pipe ends. Careful consideration of the design and layout of the glass system is therefore essential for the best results, and the glass manufacturer, laboratory furnisher and designer must co-operate in the design and layout so that the overall programme is not held up by the waste system.

To prevent frost damage the gulley surround should be built up above the exposed glass pipe and covered.

The main feature of laboratory waste systems is the connection of a series of down-pipes from sink and bench outlets to a nearly horizontal pipe discharging into the main drain. Centre distances between the outlet connections from prefabricated bench units are purely nominal because the degree of accuracy with which they can be manufactured and installed is limited. A laboratory furniture layout should be prepared using these nominal dimensions. A datum should then be struck from some fixed point such as an internal wall, and using the glass manufacturer's standards a waste system layout should be superimposed on the laboratory layout. Arrangements should be made with the laboratory furniture manufacturers to cut all bench unit outlets on site so that the necessary tolerance can be given. Expensive special fittings and loss of time can

* Unilever Ltd., Food Research Department, Colworth House, Sharnbrook, Bedford.

be avoided by ordering standard glass pipeline fittings at an early stage in the programme. A wide range of standard fittings is now available (ex-stock) including straight lengths up to 6 in. in diameter and 6 in.-10 ft. long. Standard bends, tees, traps and drip cups are also available. In spite of careful planning it may still be necessary to design some special fittings on the site at the time of installation. These specials can be supplied within 48 hr. of receipt of details by the manufacturer, but the number should be kept to a minimum.

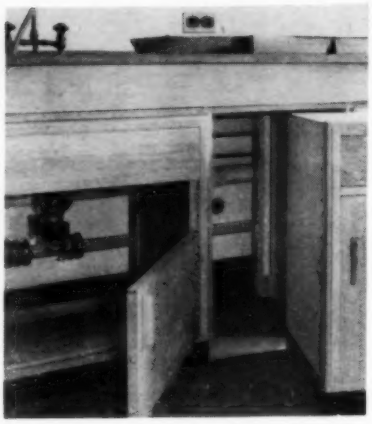
Joints and supports

Tensile stresses in the system must be avoided at all costs, because although glass has a very high compressive strength its tensile strength is relatively low. Extra attention to the installation of joints and supports and to lining up will be amply repaid by long life and trouble-free service.

Expansion should be allowed for in accordance with general design principles, but glass has such a low coefficient of expansion that it will be adequately taken up in most laboratory layouts by normal bends. Slip joints are recommended if long sections make allowance for expansion necessary. A gasket should be used for sealing all joints in glass waste systems. Gaskets may be made of PVC, polythene, nebar cork or some synthetic rubbers, and when material is selected the effluent in contact with the gasket must be considered.

Two methods of joining glass pipes are possible; one with cast iron flanges and tie bolts (Fig. 1A) and the other with screwed plastic couplings (Fig. 1B). In both cases the joint comprises two couplings, an insert and a gasket, assembled on the tapered external faces. The whole system can be glass, but it may be necessary in special cases to join some other kind of pipe to the glass pipe. Special metal flanges (Fig. 1C) drilled to suit the flanges on the glass pipe should then be used, or if the non-glass pipe is lined, glass adaptor rings may be used (Fig. 1D).

Pipes should be supported at 4 ft. centres at most and each bracket must contain a soft material insert to insulate the pipe from the bracket. Each section should be independently supported and the brackets should be fully adjustable so that the mating faces can be correctly registered before the joint is finally closed. Flanges will then remain parallel and the gaskets will be uniformly compressed. Bolts should always be tightened evenly and never more than is necessary to obtain a leak-proof joint.



Blockages and renewal of gaskets can be attended to if standard removable under-bench furniture units are used.

Glass wastes outside the building

Service and waste systems must be considered when the building is designed. In multi-storey buildings waste pipes are usually in vertical internal ducts and discharge into the main drain in a service basement.

In single-storey laboratories, however, it may be necessary to discharge wastes through external walls into gullies. Exposed glass pipe is particularly liable to damage by frost or accident and must be protected. The gulley should be completely tiled (Fig. 2) or lined with an acid-resisting cement, and the projecting portion of glass pipe should be lagged. The gulley surround should be built up above the highest point on the exposed pipe and fitted with a removable cast iron top.

Maintenance

Little maintenance will be required. It will occasionally, of course, be necessary to remove sections to clear blockages which occur despite all precautions and to renew gaskets, but this can be done quickly if standard removable under-bench furniture units are used (Fig. 3) and if the waste system has been properly planned and installed.

The authors wish to thank the Directors of Unilever Ltd. for permission to publish this note.

NEW FOR THE LABORATORY

(*Continued from page* 436)

streams of material from the roll into appropriate chutes underneath. These chutes direct the fractions into receptacles beneath.

The high tension generator is an entirely new design, highly efficient and readily controllable.

There are electrical and mechanical locks to prevent access to either the separator or the high tension set when the current is switched on. The machine is enclosed and fitted with large perspex windows which permit a good view of the separation process, and all the controls are assembled for convenient operation.

Provision has been made for cleaning the machine thoroughly between samples. There are no ledges or projections to collect material, but the whole interior can quickly be exposed for cleaning.

Metabolic Shaking Incubator

This apparatus has been designed for biochemical and biological research which does not require manometric determination. It can be used for tissue slice or homogenate studies, enzymes kinetics, microbiological fermentation, protein coagulation, serology, and chemical kinetics.

The general design follows that of a water bath with an outer case of heavy gauge steel and an interior of stainless steel, thermally insulated by a minimum of 1 in. glass wool. It is fitted with a shaking device, consisting of a sturdy frame with runners attached to the bath sides into which fits a 12 in. × 10 in. × 4 in. stainless carrier running in nylon bearings. The carrier and lid are so arranged that any gas atmosphere can be maintained above the metabolic system. The gas space is at a saturated humidity and so eliminates moisture loss from the system under investigation. Depending upon the user requirements, suitable clips can be provided to hold most types of reaction vessels. The outer case is extended to house an electric motor and gear unit to give a variable shaking speed of between 70 and 200 oscillations per min. with a shaking amplitude of 2 in.

The temperature control is by a sensitive helical bi-metal regulator, giving a 40°C. range of temperature control from any pre-set origin. This operates in conjunction with a vacuum thermal delay relay. Suppliers are Laboratory Thermal Equipment Ltd.

Perfumes for Cosmetics

9. SHAVING PREPARATIONS

By V. Vasic, CH.E.

*More than any other exclusively male cosmetics, shaving preparations depend for their success upon the right choice of perfume. Here Mr. Vasic discusses the formulation and perfuming of the whole range of shaving preparations, from ordinary shaving sticks to lotions for electric shavers. A number of formulæ for perfume compounds are given.**

WHILE it may be best to stick to the odour types popular for men's toiletries, such as lavender, fern, leather, eau-de-cologne, fougère or spicy, it is always possible to introduce a novel note into shaving preparations. Men still go for so-called " masculine " scents, but they are beginning to accept other fragrances. Shaving preparations now contain single floral scents as well as floral bouquets. What they once considered purely feminine-type odours are now being accepted with minor, if any, modifications.

Pre-shave preparations

Pre-shave preparations, such as skin conditioners and beard softeners, prepare the beard and the skin for a closer shave than is achieved with the shaving preparation alone.

Skin conditioners. Conventional shaving soaps and lather shave creams seldom lack beard-softening action, but it is frequently desirable to increase the body and lubricity of their lather and minimise abnormal sensitivity of the skin to mechanical and chemical effects. Preparations formulated specifically for this purpose are generally used in barber shops rather than in the home.

Beard softeners. Non-lathering or brushless shaving creams lubricate well but frequently do not soften the beard rapidly or adequately. Emulsification of the natural oil on the beard and suspension of the facial soil by a solution of soap or synthetic detergent, applied before the brushless cream, are highly effective in speeding up and making more complete the wetting and softening of the beard by the water contained in the shaving cream.

Pre-shave preparations can be perfumed with 0·25 to 0·5% of a suitable compound. If a small amount of terpineol (not over 0·1%) is used to cover the soap odour, the lower percentage of perfume will be adequate. About 0·1% menthol will impart a pleasant cooling effect to the shave.

Lather shaving preparations

Shaving soaps. In order to produce a good shaving soap some changes must be made in the formulation and manufacture of toilet soap. In a shaving soap, potassium hydroxide replaces all or part of the sodium hydroxide. Solid shaving soaps usually consist of a mixture of tallow and coconut oil soaps, to which a certain amount of potash soap is added.

Perfuming. The perfume must withstand the alkaline reaction without changing with age. In the manufacture of any solid shaving soap, the perfume is best incorporated during the milling process. Shaving soaps can be perfumed with 0·5% to 1·5% of a suitable perfume compound.

Shaving creams

A lather shaving cream may be described as a solution of soap in glycerol and water, in which excess solid soap may be dispersed.

Type of perfume. In perfuming shaving creams, rose and lavender have long been the conventional choice, but there is no reason why other suitable perfumes should not be used.

Concentration of perfume. In common with liquid soaps, lathering shaving creams require fairly heavy perfuming as small amounts of perfume have little effect. Usually 0·5 to 1·0% of perfume compound is required to produce a well-scented shaving cream.

Incorporation of perfume. After complete saponification of the shaving cream mass, checking for free alkali, neutralising and adjusting with excess of fatty acid, the batch is stirred repeatedly while cooling, and perfume is added at about 40°C.

According to another manufacturing process, when the cream has reached the desired free fatty acid content and total fatty acid content, cold water is turned into the jacket of the mixing kettle and mixing continued for several hours or overnight. The perfume is then added and stirred in thoroughly.

Shaving powders

Many soap powders consist mostly of mixtures of good powdered toilet soap and powdered shaving soap, from 15% to 60% of the latter being used. Such soap powders often contain small amounts of rice starch, violet roots in powder, special phosphates, etc., in order to improve the hygroscopicity and/or the foaming activity, or to render the soap powder beneficial to the skin. As a rule, shaving soap powders are less popular than other shaving soaps because they are apt to absorb humidity from the air with its ensuing disadvantages.

Incorporation of perfume. The perfuming of shaving powders is achieved by triturating a small quantity of the powder with the perfume compound and this over-perfumed proportion should then be blended with the rest of the powder mass. Sifting is advisable to avoid lumping.

The usual range of concentration employed is 0·5 to 1·5% of perfume compound.

Perfume compounding

The compounding of perfumes for shaving soaps, creams and powders is particularly difficult, for the perfume must be fully adapted for the purpose. The perfume compound must

* Previous articles in this series have covered: Face Powders (July 1958), Face Creams (August), Lipsticks (October), Deodorants (June 1959), Bath Preparations (September), Sun Tan Preparations (December), Depilatories (August 1960) and Hand Preparations (September).

be tested for alkali resistance and compatibility with soap. Another consideration always to be borne in mind is the fact that the skin of the face is particularly sensitive, and that irritating effects have been observed in connection with aromatic chemicals, such as eugenol, heliotropine, etc. Finally, shaving soaps are usually white, so chemicals which are apt to cause discoloration, such as indole, vanillin, isoeugenol, methyl anthranilate, etc., should be avoided.

Perfume compounds for use in lather shaving preparations must be well fixed. Among fixing agents, resinoids, and other resinous products are of paramount importance for this purpose.

Perfume A.P. 21
For shaving soap

Lavandin	20
Philaria S, Givaudan	20
Fougère 36, Givaudan	20
Menthanyl acetate	10
Bermagote 57, Givaudan	8
Lilial, Givaudan	5
Coumarin	5
Mousse de Chêne 33, Givaudan	5
Versalide for soap	5
Musk ketone	2
	100

Perfume A.P. 21 bis
For shaving soap

Citronellol	20
Geraniol	20
Fuchsia, Givaudan	20
Bermagote 57, Givaudan	15
Sandalwood oil	5
Mousse de Chêne 30 Givaudan	5
Versalide for soap	5
Hédéra, Givaudan	5
Coumarin	5
	100

Perfume A.P. 14
For lather shaving cream

Lavandin	20
Bergamote 57, Givaudan	20
Aldehydine 133, Givaudan	10
Neroly 27, Givaudan	10
Philaria S, Givaudan	10
Mousse de Chêne 33, Givaudan	5
Verveine Synth. L. G., Givaudan	5
Lilial, Givaudan	5
Orange Oil, Guinea	6
Methyl naphtyl ketone	2
Versalide for soap	5
Musk ketone	2
	100

Perfume A.P. 14 bis
For lather shaving cream

Lavandin	20
Fuchsia, Givaudan	20
Phenyl ethyl alcohol	10
Menthanyl acetate	10
Geranium 1431, Givaudan	10
Fougère 1734, Givaudan	10
Lemon oil	5
Mousse de Chêne 30, Givaudan	5
Coumarin	5
Musk ketone	3
Versalide for soap	2
	100

Brushless shaving creams

Lather and brushless shaving creams differ in purpose as well as in composition. A lather shaving cream is a soap of a cream consistency, while brushless shaving cream is not a soap in the chemical or industrial meaning of that word. Brushless shaving creams are oil-in-water emulsions, very similar in appearance to vanishing creams and are, in fact, vanishing creams which contain 3-5% of soap and an increased amount of mineral oil or other oily ingredients.

The main advantage of the brushless shaving creams is generally considered to be that they contain little or even no soap, and therefore, exert no irritating and smarting action on a sensitive skin. Brushless shaving creams have the further advantage of eliminating the shaving brush and of quicker action.

Perfuming. In compounding a perfume for a brushless shaving cream, the same comments as for vanishing cream perfumes apply. In selecting a perfume it is necessary to avoid the sweeter floral perfumes which would be regarded as effeminate, but one does not need to go to the other extreme and choose a medicated scent. Lavender, fougère and spice bouquets are particularly suitable for perfuming of brushless shaving creams.

The brushless type of shaving cream requires less perfume than the lathering type. A concentration of 0·2-0·4% of perfume compound should be adequate.

Perfume A.P. 15
For brushless shaving cream

Raldeine Delta, Givaudan	20
Sophora 42, Givaudan	20
Phenyl ethyl alcohol	16
Bergamot oil	10
Roselium, Givaudan	10
Sandalwood oil, Mysore	5
Cyclamen aldehyde	5
Ylang-ylang oil, Bourbon	3
Citronellal	1
Coumarine	2
Musk ketone	3
Versalide	5
	100

Perfume A.P. 15 bis
For brushless shaving cream

Lavender oil	20
Fuchsia, Givaudan	20
Phenyl ethyl alcohol	15
Menthanyl acetate	10
Geranium 1431, Givaudan	10
Geranyl acetate	10
Lemon oil	5
Mousse de Chêne 33, Givaudan	5
Coumarin	5
	100

Aerosol shaving creams

The perfumes for shaving creams of the aerosol type should be compounded very carefully. The perfume compound should be designed specifically for a given cream and its ingredients chosen carefully to avoid compatibility difficulties. One of the chief factors in compounding is to use components which are highly soluble in aerosol propellants. Great care should be exercised in using all types of resins, such as labdanum, opoponax and oak moss, to avoid difficulties with respect to solubility, but it does not mean that they must necessarily be completely avoided. Balsams and crystalline substances such as coumarin, heliotropin, vanillin, synthetic musks and many others should be used with caution. All those components can and do sometimes precipitate out of solution when in the presence of liquid propellants.

In order to prevent precipitation, dipropylene glycol is often added to the perfume compound to the extent of from 5 to 15%. It is an excellent solvent for most perfume ingredients as well as for propellants. Propylene glycol can also be used for this purpose, but dipropylene glycol is the better solvent.

Lavender, spice and fougère fragrances have long been popular and single florals have also obtained some degree of popularity. It is possible to select a perfume which is suitable for a similar product designed for normal packing and to modify it in such a manner that there is practically little or no change in the given fragrance and the perfume will be stable in the presence of the propellant in question. Heavily fortified lavenders and fougères give excellent results.

Eau-de-colognes are far less easy to formulate, particularly as the citrus oils are not very stable under aerosol conditions.

After-shave preparations

After-shave preparations relieve the feeling of tautness and discomfort caused by shaving. They refresh and cool the skin, soothe minor irritations, and impart a feeling of well-being.

After-shave preparations are: bay rums, lotions, stick lotions, solid and liquid creams, powders and styptics.

Bay rum. Early after-shave lotions were based on the use of floral water, witch-hazel extract, bay rum and similar materials. For many years such materials have been listed in official and semi-official pharmacopœias and formularies and were

widely used both as such and in simple compositions to finish off the shave.

Bay rum

Rum	137·7 c.c.
Alcohol, 95°	158 c.c.
Oil of bay	3 g.
Water, distilled	700·0 c.c.
Burnt sugar	1·3 g.
	1,000

Mix the rum and alcohol. Add oil of bay. Add water. Colour last. Filter (double filter paper) through Kieselguhr.

Bay rum N.F. V
Semi-official formula

	c.c.
Oil of bay	8
Oil of orange peel	0·5
Oil of pimento	0·5
Alcohol, 95°	610
Water, distilled	381
	1,000

Filter through talc or kaolin.

After-shave lotions. Alcoholic lotions are by far the most widely used after-shave preparation. When properly formulated, an after-shave lotion is especially effective after the usual brush-type shave with soap or lather cream and an electric shaver. A good lotion should possess mild astringent properties, have a slight cooling effect and be faintly and pleasantly perfumed. A small percentage of an emollient and even smaller percentage of antiseptic are advantageous. The popular after-shave lotions contain alcohol between 25 to 60% by volume to provide a stinging and cooling effect. Concentrations of alcohol higher than 60% by volume cause excessive sting and smarting. Isopropyl alcohol, even when of good odour, is never acceptable in a quality product because its odour is difficult to cover. After-shave lotions frequently contain menthol for cooling. Its concentration can be as low as 0·005% or as high as 0·2%. About 0·1% menthol gives ample cooling to allay the pain of a "close" shave. When higher concentrations are used, menthol has an undesirable rubefacient effect and its odour becomes overpowering, causing difficulty in perfuming the product.

Choice of perfume. The perfume plays an extremely important part in the after-shave lotion and the selection of a suitable perfume undoubtedly is the most difficult aspect of the formulator's task. The usual considerations of freedom from irritation, sensitivity and sensitisation apply with special weight in a product used daily on the freshly-shaven face, but the question of immediate and continued consumer acceptance by its odour is of primary importance. The odour should be a bracing one and should be acceptable not only to the male user but to the opposite sex as well. Men prefer clean, fresh odours with an "outdoor" character. Among those popular for after-shave lotions are fougère, lavender, spice and eau-de-cologne types. In addition, some oriental, tobacco and leather notes have proved intriguing to prospective customers.

Concentration of perfume. The usual range of concentration employed is from 0·5 to 1·0%, depending on the nature of compound and the effect desired.

Incorporation of perfume. After-shave lotions which contain below 40% by volume of alcohol are difficult to perfume by simply dissolving it in the lotion, because many perfume compounds contain materials with limited solubility. To overcome this, solubilisers can be employed to produce clear solutions of perfume compounds in after-shave lotions with low alcohol content. The amount of solubiliser depends upon the type of perfume used as well as on the solubilising effect of the solubiliser. For most perfume compounds, three to five parts of solubiliser will solubilise one part of perfume, although with certain compounds as much as eight to nine parts of solubiliser may be necessary to obtain a clear solution. In order to increase the solubility, a co-solvent such as diethylene glycol monoethyl ether is recommended.

Perfume A.P. 16
For after-shave lotion

Diethylene glycol mono ethyl ether	50
Bergamot oil, terpeneless	15
Lavande 83, Givaudan	10
Neroly 27, Givaudan	7
Pine 57, Givaudan	5
Ebenol S. L., Givaudan	3
Verveine Synth. L.G., Givaudan	3
Dianthus 809A, Givaudan	2
Patchouly Anhydrol A, Givaudan	2
Citron Soluble L.G., Givaudan	1
Citronella oil, Ceylon	1
Versalide	1
	100

Perfume A.P. 16 bis
For after-shave lotion

Diethylene glycol mono ethyl ether	40
Lavender oil	10
Neroly 27, Givaudan	10
Geraniol	10
Citronellol	10
Geranium 1431, Givaudan	10
Menthol	5
Roselium, Givaudan	5
	100

Perfume S.V. 67
For after-shave lotion

Coumarin	19
Lavender oil, Mont Blanc 40/42°	10
Geraniol	9
Geranyl acetate	7
Bergamot oil	7·5
Neroli, Synth.	8
Ethyl phthalate	5
Oakmoss 30, Givaudan	2·5
Vetivert oil, Java	1
Terpinyl acetate	3
Linalyl acetate	3
Jasmin 231, Firmenich	6
Fleur d'Orange, C.N.C., Firmenich	3
Muguet 1022, Firmenich	6
Lilafleur, Firmenich	6
Musk xylol	3
Phenylacetic acid	1
	100

Stick after-shave lotions

After-shave lotions in stick form have achieved some recent popularity. They are very convenient to use, particularly when travelling, and owe their acceptance to novel and functional form rather than to a marked superiority in effectiveness. They leave a heavier residue on the skin than conventional after-shave lotions and are somewhat alkaline, rather than acid, in reaction.

The preparation of after-shave sticks is similar to the preparation of deodorant sticks and solid perfumes. The perfume types which are recommended for after-shave lotions are equally suitable for stick after-shave lotions.

After-shave creams

After-shave preparations can be in the form of creams, both solid and liquid. Men who find an alcoholic after-shave lotion uncomfortable or irritating, particularly after exposure to sun, wind or inclement weather, frequently will use a simple emollient vanishing cream or hand lotion to finish off the shave. Creams developed specifically for after-shave are designed to relieve tenderness, dryness and roughness of the skin after shaving. They are acid in reaction to correct the alkalinity of soap, and they are markedly emollient without oiliness.

Choice of perfume. Perfume should be fresh rather than sophisticated and eau-de-cologne, lavender, lilac and certain bouquets are indicated. A concentration of 0·2-0·4% of the perfume compound should be adequate for an after-shave cream.

After-shave powders

After-shave powders impart a smooth matt finish to the face, masking the shine left by a too oily brushless shave or toning down the

" too-scrubbed " look after a lather shave. They help to cover minor skin defects and to hide an inadequate shave.

After-shave powders differ from face powders in many significant respects. Their slip and adherence are relatively more important than covering power and bloom. High slip enhances the very desirable smooth, cooling feel on the skin and good adherence prevents powder from dusting off too easily on the clothing. Covering power is of secondary importance in the sense that it is necessary only to mask shine. After-shave powder must not be so opaque that its presence on the face is obvious. The powder must have good water absorbency to be able to absorb moisture from the skin without caking or streaking, because the face usually is difficult to dry completely after shaving, but it need not have the same degree of oil absorbency required in a cosmetic face powder.

The manufacture of after-shave powders and incorporation of perfume does not differ materially from that of face and body powders. The perfume types which are recommended for after-shave lotions are equally suitable for after-shave powders.

Styptics

Styptic pencils and alum blocks have a rather special function. The use of styptic pencils is limited solely to the staunching of bleeding from minor cuts produced in the course of shaving. These preparations are not perfumed.

Preparations for electric shaving

More and more men are using electric shavers. In wet shaving the beard must be covered and softened up with alkaline lather and warm water, whilst in electric shaving the beard must be stiffened and raised. An electric shaver works best when the face is perfectly dry, since the hair of the beard should be stiff. When the skin is moist the dry shaver slips over the whiskers without cutting them. Electric shaving can be made much easier by the use of special cosmetic aids. Two different preparations are available. The first employs talc, the second depends on an alcoholic lotion.

Pre-shave powder for electric shavers. Pre-shave powders consist mainly of talc to absorb any moisture or sebaceous secretions that may be in the way and to leave its characteristic " slip " on the skin, increasing the gliding efficiency of the electric apparatus. In pressed form, these secretion-removing powders are used in various ways as " shaving powder stones."

Pre-shave lotions for electric shavers. Pre-shave lotion may be either astringent or oily. The former should make the hair stiff and dry, assisting in making it stand more upright. This is achieved by employing a high concentration of alcohol for its dehydrating effect, and by adding a mildly astringent material, such as lactic acid or zinc phenolsulphate. Menthol and camphor serve to cover up minor trauma. A pre-shave lotion must be set to an acid *p*H. The optimum solidity of the beard-hair keratin is at about *p*H 4·9. Lotions used before electric shaving should, therefore, have a *p*H of just under 4·9 (=isoelectric point of the keratin); good working degree of acidity may lie at a *p*H between 4·5 and 4·8.

The oily type lubricates the beard and skin by depositing a thin film of oil on the face. This prevents drag and pull of the cutting head against the skin, most troublesome in warm, humid weather, and generally improves performance by reducing friction.

Choice of perfume. Only specially tried and tested perfume oils should be used in electric pre-shave lotions, as corrosion of the metal parts of the shaving apparatus must absolutely be avoided. The incorporation of a small amount of lauroyl sarcosinate was suggested as an anticorrosive agent. The perfume must be stable in the acid media.

After-shave lotions for electric shavers. Astringent lotions applied before use of the electric shaver can sometimes lead to a perceptible reduction of fattiness and a drying effect on the skin, and the action of the shaver may irritate the skin. Consequently, the after-shave lotion should be somewhat soothing and emollient rather than stimulating.

Perfume S.V. 70
For pre-shave and after-shave lotions for electric shavers

Lavender oil, French, 40°-42° ..	28·0
Linalyl acetate ex Bois de rose oil ..	14
Geraniol, pure	5·5
Terpinyl acetate	27·5
Bornyl acetate	8·5
Citronellol	5·5
Amyl salicylate	5·5
Musk xylol	5·5
	100

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ANTIBIOTICS FROM MOSSES

An examination of 12 species of mosses at Arizona State University has indicated that three produce substances capable of inhibiting the growth of various bacteria and other fungi. The method of extraction included several solvents. The extracts were not consistent in their antagonistic activity against the various species of micro-organisms, nor were those that displayed antibiotic action always effective against the same organisms. Results indicate unstable products as well as physiological variation in the mosses.—McCleary, Sypherd and Walkington, *Science*, 1960, **131,** 108.

Research ★ Changing to Metric ★ Pharmaceutical Ethics

This year's British Pharmaceutical Conference was given a stimulating if non-pharmaceutical send-off by the chairman, Prof. W. H. Linnell, who discussed the problem of reconciling personal freedom with planned research. Two other major conference topics were a "middle of the road" plan to discard the apothecaries' for the metric system, and the professional responsibilities of the pharmacist in supplying medicines—the speaker insisted that ethics should always come before profits. Here is a summary of these papers, the disinfectants symposium and a brief review of some science papers.

IN his opening address to the British Pharmaceutical Conference at Newcastle upon Tyne on September 5, the chairman, Prof. W. H. Linnell, took as his theme "Academic research and the five freedoms." The benefits flowing from academic research had been enormous, but today powerful forces were working against it in many parts of the world, and these must be restricted at all costs. In time of peace, university research should be free from any restrictions—particularly with regard to publication. Secret work of any kind had a place in universities only during an emergency.

Whether or not Britain retained her position as a world power would depend largely on her research activities in the near future. These could not exist unless there were people capable of extending the boundaries of knowledge, and this in turn was dependent on the education of the young and on some directive influence on their potential.

In these matters, he said, dictatorial governments possessed a great advantage—they could determine and enforce a course of action. Russia's far greater output of scientists and engineers posed a greater threat than the hydrogen bomb. It would be a comforting thought if demonstrators would carry placards demanding "More education and more research" rather than "Ban the bomb."

Planning for discovery

It was wrong and even dangerous to evaluate research solely by its contribution to modern living, he stated. How often had the purists been confounded after claiming that the beauty of a certain piece of research "resided in the fact that it could not be of use to anybody." Prof. Linnell then enumerated many famous examples of this, and went on, "Although it is impossible to plan discovery, it is possible to plan for it. The basic problem facing us today is how to plan our research effort without injuring the intellectual freedoms which must be jealously guarded."

Could anything be done within the universities to ensure that the great potential for research was utilised in really worthwhile projects? It was a great tragedy that much effort at present was wasted on second-class projects. Some means must be found of leading those of adequate intellect who had no compelling alternative purpose into the more important spheres of endeavour. If this could be done without trespassing on academic freedom, beneficial results might follow.

Prof. Linnell also suggested that if the public were to be convinced that a great deal more money must be spent on education and research, much greater attention must be focused on the absolute necessity for research. The object could be only achieved if the press regarded the subject as of first-class importance and meriting front page position.

This placed an onus on the scientists themselves, because widespread coverage of research results would occur only if the articles appearing were made interesting as well as intelligible.

Change to the Metric System

Possible dates for a three-stage change to the metric system in pharmaceutical practice were given by Dr. K. R. Capper, Director of Pharmaceutical Sciences, the Pharmaceutical Society of Great Britain, during the first professional session of the conference.

They were: All tablets, capsules, injections to be in metric doses from 1963; ointments, lotions, eyedrops, and other external preparations, 1968; mixtures, linctuses, and other liquid internal medicines, 1973—provided that the majority of doctors will prescribe in the metric system.

For such a scheme of graded abolition of the apothecaries' system it was essential that there should be an agreed code of practice prepared by the medical and pharmaceutical professions, active support from the Ministry of Health and interim periods allowing for stock-clearing and prevention of waste. Action on these lines was needed immediately.

Dr. Capper was convinced that the time would come when the continued use of the apothecaries' system would be an embarrassment rather than a convenience and then they should not hesitate to abandon it. He also believed that this time had not yet been reached.

"Until the medical profession has made it clear that it wants and will actively support the total change to the metric system, I believe that organised pharmacy should act only if there are good pharmaceutical reasons for doing so."

Dr. Capper said he realised that this middle-of-the-road plan was likely to be attacked from both sides, but the attitude of influential members of the medical profession was likely to be the decisive factor.

"We as pharmacists have it in

our power to decide whether we should control events by anticipating and planning for them, or leave these matters to others when it is most probable that in ten, twenty or thirty years we shall have so many variations of the metric system that an intolerable burden will be imposed on our successors. To avoid this we must be ready with a comprehensive plan for using the metric system in medicine and pharmacy."

Ethical Responsibilities and Profits

On the final day of the conference at the last professional session Mr. C. G. Drummond of Edinburgh called for an alertness and awareness on the part of pharmacists due to the tremendous changes that have taken place in pharmacy practice in the last 25 years.

In a paper entitled "Professional Responsibilities of the Pharmacist in the Supply of Medical Substances" he said that the sense of moral, or ethical, responsibility of pharmacists had been demonstrated recently by their action in accepting advice from the Pharmaceutical Society that the so-called "tranquillisers" should only be supplied on prescription by a medical practitioner.

He continued: "The marketing of a new preparation, firmly stated and believed by its manufacturers to have no addictive properties, does not render the situation any less difficult for the pharmacist. Such a preparation may, in the light of experience and passage of time, be found to be far from innocent. It would seem, therefore, that in the case of new products used for specific purposes, a healthy scepticism on the part of the pharmacist is part of his professional discrimination."

It was imperative for the pharmacist to bear in mind "that any consumer of a drug possessing the characters of addiction was potentially a drug addict." Even a person in normal physical health might find it difficult to ignore the persistent appeals of the advertisers of "patent medicines," but, said Mr. Drummond, there must come a time when the pharmacist should ask whether his qualification was being exploited and decide that there were some publicly-advertised medicines which he could not bring himself to sell regardless of economic pressure.

Mr. Drummond urged that as the nation was subsidising heavily the training of pharmaceutical students such money should be spent wisely. It was economically wrong to deny the public the safeguards provided by the knowledge of the highly trained pharmacist merely on the ground that the British way of life prevented the granting of a monopoly to the expert in the action, uses and abuses of pharmaceutical chemicals, drugs and medicines. The free sale of many proprietary medicines, now permitted by law to be effected by untrained and unqualified vendors, made the exploitation of the public by the unscrupulous adventurer easier and more successful.

Disinfection and Sterilisation

Dr. S. E. Jacobs opened the Symposium on Disinfection with a paper on some aspects of the pure dynamics of disinfection. The idea of obtaining disinfection evaluation curves by plotting the logarithm of the number or percentage of survivors against time was first advanced in 1907. It was soon found that experimental data deviated from a straight line curve and now modern work has shown there is no compulsion to believe that the logarithmic law must apply rigidly in all circumstances. All disinfectant evaluation methods may be greatly affected by concentration and kind of cations present, *p*H, particulate and organic matter, if present, the strain of test organism and method of cultivation and harvesting and so on: but for comparison, end-point results are often useful, yet these may bear no resemblance to disinfectant activity in practice.

The author and his co-workers had attempted to predict the threshold concentration for phenol acting at 35° on standard cultures of *Esch. coli*. Their experimental technique was novel and involved the automatic addition of small constant volumes of broth at 100 seconds intervals ensuring after a few hours a constant viable population. Forty hours after the culture was started the required amount of 5% phenol was dropped in over a 5 min. period and thereafter at suitable intervals samples taken and survivors counted.

Results indicated that during slow disinfections rapid death may accompany an increase in viable count for a time. Two concepts were considered —(*a*) that the inherent ability of a cell to withstand damage varies according to the stage it has reached in the division cycle and (*b*) after fission in the presence of phenol the daughter cells are more susceptible than the parent, and the author introduced new ideas to make it possible to imagine how under certain circumstances a lower concentration of phenol could be more effective than a higher. These academic concepts were most lucidly and attractively presented by Dr. Jacobs and stimulated considerable discussion.

Phenolics

Dr. A. M. Cook dealt more broadly with phenolic disinfectants. Speaking on their mode of action he pointed out that some bacterial enzymes are not completely inactivated by phenol at concentrations above those lethal to the organism, indicating that it is unlikely that bactericidal action follows from complete enzyme inactivation. The author considered that far too much importance was still attached by manufacturers and customers to the Rideal Walker, Chick Martin and Food and Drug Administration Phenol Coefficients, because there are many variable factors concerned.

In addition to the factors mentioned by Dr. Jacobs which affect action of disinfectants the actual chemical nature of phenols was important. Dihydric and polyhydric phenols are generally less active than monohydric phenols, the alkylation of which potentiates their activity. A similar enhancing effect is produced by halogenation of phenols and increases with increasing atomic weight of the halogen. Cresol B.P. is a mixture of *ortho*, *meta* and *para* cresols together with small amounts of xylenols, more bactericidal, less toxic and less soluble than phenol. The chloroxylenols were also discussed.

The importance of the soap type and content of lysol was stressed, and the need for further effect by the Pharmacopoeial authorities or the trade itself to improve the standardisation of this important disinfectant was mentioned. The fundamental aspects of soap-phenolic disinfectant phenomena were discussed and the two main theories enunciated. Both agree about the

rapid decrease in death-time with increasing concentration until critical micellar concentration is reached. If the Rideal Walker test is used as the assessment of such a disinfectant then anomalous results are inevitable if dilutions around the critical micellar concentration have a death-time around 7 min.

Finally, phenolic disinfectants in general were discussed, attention being drawn to the fact that most commercially available phenolic disinfectants are coal tar derivatives. The author regretted that the bactericidal activities of most of these formulations are judged by phenol coefficient against *Salm. typhi* alone, which in some cases is very misleading.

The author concluded that phenolic disinfectants will probably retain their place as good general purpose disinfectants and that continued research on the mode of action and evaluation of soap phenol solutions are well justified.

Industrial disinfection

Dr. J. G. Davis (whose paper was read by Mr. A. H. Walters) was first concerned with general terms used in industry in connection with disinfection, and considered that efficient cleaning should remove mechanically about 99% of the bacteria on a dirty object and was therefore an integral part of the sterilising process. It was always necessary to be certain, when chemicals were used, to know if they were acting as bactericides or bacteriostats in any given conditions, special attention being given to spore-bearing organisms. The commonly used sterilisers in industry were then discussed, *viz.*, hypochlorites, Q.A.C.'s., alkalis, iodine, iodophors, chlor-compounds and amphoteric and ampholytic compounds, and the importance of specificity with reference to the micro-organisms was underlined.

Dr. Davis agreed with the previous speakers in considering it vital that full consideration be given always to concentration, temperature, time of contact, *p*H, amount and type of organic matter, types of organism present and the types selected for assessment purposes, and the physiological condition of the organism. The nature of surfaces to be disinfected in various industries such as dairying, brewing, food and catering were discussed together with methods for in-place cleaning and sterilising. In this way the practical aspects of scientific evaluation of disinfection in industrial practice were covered in the most objective manner.

Hospital disinfection

Mr. Walters spoke on some aspects of chemical disinfection in hospitals, which, he suggested, falls into two main parts—(*a*) as applied directly to the patient, and (*b*) to the environment in which the patient is nursed. Trends in modern research on skin disinfection were discussed with particular reference to control of resident skin flora. For instrument sterilisation interest in spore control was centred at the moment on the various hydantoin formulations and trichloroisocyanuric acids. Chemical methods for sterilising thermometers, heart-lung machines and textiles were described.

Disinfection practice in U.K. hospitals varied according to environment, tradition and personal preference; thus it was difficult to estimate disinfectant activity where uncertainty may exist concerning concentration, immersion time, condition of object or surface to be disinfected, frequency of use, and time elapsing between renewal of solutions. Poor housekeeping techniques could contribute to hospital acquired infections. The main difficulty was instituting suitable disinfecting techniques and maintaining them. The author described his ZONE system which facilitated the study and resolution of such problems, and aimed at tightening control of use of disinfectants and reducing the human hazard in their application.

All the papers were well referenced and should be published in due course.

Science Papers

Two concurrent Science Sessions were held on September 6. Section A met under the chairmanship of Mr. H. Treves Brown, last year's conference chairman; Section B under Prof. Linnell.

Alkaloids

The first paper to be presented in Section A was "Alkaloids of *Voacanga scheinfurthii* Stapf.: Part I—Voacamine and Vobtusine," by F. Fish, F. Newcombe and J. Poisson. Considerable interest has been shown in the alkaloid yielding members of the plant family Apocynaceæ. Several species of the genus Voacanga have been examined, among them *V. africana* from which ten alkaloids have been isolated. Two of these, voacamine and vobtusine, have been extracted by the authors from *V. schweinfurthii* and their method of isolation and identification was described.

The second paper was "Vegetable Purgatives containing Anthracene Derivatives: Part XI—Further work on aloin-like substances of *Rhamnus purshiana DC.*," by J. W. Fairburn and S. Simic. It has been shown previously that cascara bark contains an aloin-like substance that was named Compound A. The authors were not satisfied that it was a pure substance, and the paper describes how, by paper chromatographic and countercurrent techniques, Compound A has now been resolved into four closely allied anthraquinone derivatives.

Digitalis

Other papers in this section included "Anatomical Studies in the Genus Digitalis: Part II—The anatomy of the inflorescence of *D. lanata* L.," by P. S. Cowley and J. M. Rowson; "Studies in the Genus Digitalis," by J. M. Rowson; Part VI—"Variations in glycosidal content of British clones of *Digitalis purpurea*," and Part VII—"Variations in glycosidal content within clones of *Digitalis purpurea*." The first paper is a study of the morphology and detailed anatomy of the inflorescence of *Digitalis lanata*. The authors also draw attention to those characteristics which distinguish the inflorescence from *D. purpurea*. The second paper describes work which was undertaken to investigate the range of activity found in British samples of *D. purpurea* using a chemical method of estimation and with a view to subsequent examination of the heritability of high or low potencies. A positive relation was found to exist for first- and second-year activity values for each clone and suggested genetical control of activity. The third paper reports a large-scale experiment to investigate the possibility of plant-by-plant variation of glycosidal content within a number of clones of *D. purpurea*.

The first paper in Section B was "The Strength of Compressed Tablets," by E. Shotton and D. Ganderton; Part I—"The measurement of tablet strength and its relation to compression forces"; Part II

—" The bonding of granules during compression." The first part dealt with an investigation into the factors affecting tablet strength. Sodium chloride was used since it forms a satisfactory tablet without the addition of excipients, and in this way a simple system could be studied. In the second part, which is a qualitative discussion of the factors involved in the mechanism of compression of powders, the deformation of tablet granules has been followed over a wide pressure range by preparing and compressing sucrose granules with coloured surfaces. By examination of the fracture of the compacts in a strength test the structural rôle of the granule at these pressures has been determined.

" The Use of Laminar Lubricants in Compaction Processes," by D. Train and J. A. Hersey, describes a punch penetration shear test which was used to support the theory of orientation of layers within the crystal lattice as the lubricating mechanism of laminar solids. Under high applied loads, this orientation was prevented, thereby causing a high value of the shear strength. The increased shear strength was manifest in an increased coefficient of friction under high loads, as found experimentally in the die pressing of solid plugs of talc and graphite. The use of these solids as lubricants in compaction processes could not be justified at high constraining loads, where the relative density of the compact was high.

Gum emulsions

" The Emulsifying Properties of the Gum Acacia," by E. Shotton and K. Wibberley, describes a method of determining whether acacia was absorbed at the oil/water interface of an emulsion of hydrocarbon oil and potassium arabate in equilibrium with the bulk solution or if it is irreversibly adsorbed.

" Rheology of Acacia Stabilised Emulsions," by E. Shotton and R. E. White, describes the authors' use of a Ferranti-Shirley cone and plate viscometer to examine the flow behaviour of emulsions of benzene and two paraffin oils in acacia solutions.

The final paper, " A Note on the Stability of Solutions of Phenylephrine," by G. B. Best and T. D. Whittet, gives results that confirm the observation that solutions of phenylephrine colour on oxidation, but the amount of colour is no indication of the decrease in activity.

Correspondence

Cancer articles

To The Editor.

Sir: I just had the pleasure of reading the excellent review articles on the cancer problem by Dr. Davis and Dr. Darcy in the June issue of Manufacturing Chemist.

Since this problem has always interested me, I was impressed by the excellent quality and clearness of both papers and I wish to congratulate you on this initiative.

Dr. M. G. J. Beets.
Polak and Schwartz International N.V.
Hilversum,
Holland.

Consumer's complaint

To The Editor.

Dear Sir,

I have recently fitted several baths and hand-basins in my home, but I find to my surprise that they have a strong attraction for the scum that is left behind after they have been used. Is there any difference in the soap today to cause this or is it the peculiar nature of the finish of the hand-basins and baths? Also I find it extremely difficult to remove the scum with ordinary detergents.

I have questioned the suppliers of the equipment, who advised me to use a certain scum-removing product. This, it appears, cannot be obtained from a normal supplier but is obtainable from a builder's merchant. I find it rather unusual as an ordinary consumer to be referred to a builder's merchant. This indicates to me collusion amongst the new trade associations—a sort of secret league of the manufacturers of enamel equipment, the suppliers, the builder's merchants, the detergent manufacturers and others who are out to deceive the public.

How can the ordinary consumer be protected from this if it exists?

Yours truly,
I. Hopewell.
London, N.W.7

Dr. Frobenius

To The Editor.

Sir: I read with interest your editorial note on Ambrose Godfrey Hanckwitz. There is one point, however, which appears to be an error. He is said to have used the *nom-de-plume* of " Dr. Frobenius." There was, however, a chemist J. S. A. Frobenius who worked in Hanckwitz's laboratory where he was engaged on the production of ether. His claim to have discovered ether was disputed by Hanckwitz. Like Hanckwitz, Frobenius became an F.R.S. in 1729.

T. D. Whittet,
Chief Pharmacist.
University College Hospital,
*London. W.C.*1

WAVE SOLUTION

Polyethylene glycol is stirred vigorously with mercaptoacetic acid and successively water, lanolin and glycerol are added with stirring. The mixture is brought to a *p*H of 6·9 by means of ammonia to give a permanent wave solution. (Jap. Pat. 2,500/59.)

A mixture of 0·03 to 0·06% of propyl hydroxybenzoate, 1 to 3% of glycerine, 15 to 25% of carboxymethylcellulose and 75 to 85% of distilled water is applied on the hair before winding it on curlers. (French Pat. 1,174,539.)

TOOTH PASTE

A chalk-free foaming toothpaste contains at least 3%, preferably 3 to 5% of a fatty alkyl sulphate, at least 30%, preferably 35% of alcohol, at least 5%, preferably 10% of colloidal silica, and if desired, at least 5%, preferably 15% of glycerol. The colloidal silica preferably consists of fine particles with a size of 4 mμ and of coarse particles with a size of 35 to 40 μ, in a ratio of 2:1 to 3:1. (Swiss Pat. 340,956.)

ANTI-CANCER POLYMERS

The anti-cancer properties of synthetic polymers have been studied by American workers—from the Monsanto Chemical Co. and Roswell Park Memorial Institute, Buffalo, New York. In *Nature* (1960, **166,** (4727), 778-80) they say that synthetic polyelectrolytes not only inhibit transplanted tumours but also certain vital enzymes such as ribonuclease and deoxyribonuclease. Predictable reactions between synthetic polyelectrolytes and biological systems may eventually be possible by consideration of physico-chemical characteristics of the synthetic and the naturally occurring polyelectrolytes.

International Cosmetology

By J. B. Wilkinson,* B.A., B.Sc., F.R.I.C.

Cosmetic science is becoming truly international. Societies of cosmetic chemists have been established in ten countries and they are linked by the International Federation of Societies of Cosmetic Chemists. To show that the organisation is more than just a name, ISFCC held its first congress in Munich from August 31 to September 3. Here is an on-the-spot report.

THE International Federation of Societies of Cosmetic Chemists (ISFCC) is officially one year old, but it had a difficult and prolonged labour, conception taking place at least three years ago. With the establishment of a recognised field of cosmetic science, societies of cosmetic chemists have been formed in many countries, the original impulse coming from the U.S.A., where there are now 800 members. Now there are societies in Britain, Germany, France, Belgium, Denmark, Switzerland, Spain, Italy and Japan. The member societies are completely autonomous and have their own individual constitutions, but the full or " scientific " membership grade must conform to internationally recognised degree standards, and only this membership is counted for ISFCC purposes.

The conference proper began with a reception on the Wednesday evening, August 31, and the formal proceedings opened in the lecture theatre of the Technische Hochschule on Thursday morning. The lecture programme comprised 20 papers which were read under five group headings: Psychology, Analysis, Application, Active Materials and Hair. Notes on some of the papers are given below. In due course there will be full publication with discussion.

Psychology

1. *Dr. E. Paukner*—" *Psychology of odour and successful perfuming* "

Panels were asked to score (0-5) the applicability of 66 adjectives to six test odours and also allocate colour correspondence to the odours. The perfumes used were concentrated essences or pure synthetics such as geraniol, citral and eugenol. Blank tests with water and coloured water established significance levels. An interesting feature of the results was the presence of " wrong " judgments. Thus geraniol had been significantly called " spicy " and citral linked with the colour orange, not lemon. The lecturer made ingenious use of the lecture theatre's air conditioning to present each odour in turn as he tabled the results.

2. *Dr. S. Borelli*—" *Skin and Psyche* "

This paper called attention to the effect of skin condition on the mind, rather than the more publicised reverse effect of psychosomatic disorders.

Analysis

3. *Dr. P. Velon and J. Picot*—" *Evaluation of water index of lanoline and absorption bases* "
4. *Dr. P. Velon and J. Picot*—" *Analysis of creams containing various stearates* "

These were factual papers.

5. *R. James and R. L. Goldenberg*—" *The use of ternary diagrams in cosmetic formulation.*"

This was an account of a technique of considerable value. The authors, however, missed what is to me one of the most valuable aspects, namely the investigation of the tolerance of a system to small variations in formulation, *e.g.* manufacturing tolerances, thus avoiding over-critical formulæ.

Application

8. *L. Th. Schonagen*—" *Use of cosmetics in preventive medicine* "

Dr. Schonagen made the point that cosmetics are known to have " unconscious " effects in preventive medicine, but he was interested in the " conscious " use *not* for curing (this was another field) but for coping with daily stresses by preventing the effects of said stresses—this in fact is practically my own definition of the toiletries field.

He had studied the condition of housewives' skin on which he presented statistical data. Variations and abnormalities were ascribed to differences in sweat processes and content of " natural moisturising factor " in the skin.

9. *Dr. R. H. Marriott*—" *Consumer research on new products* "

He explained well the distinction between testing a product which is an improvement in a familar field and testing a really original product. The latter needs an explanatory leaflet (a prototype advertising story) to put the user in the picture.

10. *A. Herzka*—" *Spray pattern of aerosols* "

This was a useful practical paper relating spray patterns to valve type, propellant and nature of system.

11. *Dr. W. Frank*—" *Some condensation products of fatty acids with amino acids* "

An outline of the preparation and properties of a new series of detergents devised by condensing fatty acids with β-lactams.

Active materials

12. *Dr. O. Jacobi*—" *Testing of cosmetic products on animals* "

A review of test methods. An interesting point was his reference to the " fatigue effect " which is not a sensitisation, but is an irritation only caused by repeated application.

13. *Dr. H. Eder*—" *Animal investigation on the effect of biologically active substances on the metabolism* "

He explained and showed diagrams of a beautiful

(*Continued on page* 450)

* Unilever Ltd. Mr. Wilkinson and his colleagues have revised " Principles and Practice of Modern Cosmetics. Vol. I.—Modern Cosmeticology," to be published in 1961 by Leonard Hill (Books) Ltd.

Pest Control Chemicals

By D. P. Hopkins, B.SC., F.R.I.C.

Pyrethrum • Hg for eelworm control • Liquid seed treatment
Fungicides • Derris • Herbicide • Systemic insecticides

Pyrethrum

Fruit spray. In the latest Long Ashton Report there is news of a revival of interest in pyrethrum as a fruit spray.[1] This is due to " the need for information on the value of non-persistent insecticides of low mammalian toxicity as alternatives to spring washes now used on apples." However, pre-war field trials were unsuccessful, although pyrethrum itself is a good aphicide. The object of present work is to see whether these failures in the field were due to faulty formulation or application. Sprays, emulsion type, containing 0·0025% and 0·005% pyrethrins, were compared with DDT and DDT/BHC sprays; formulation was with solvent naphtha and sulphite lye emulsifier, plus *Manoxol* N. It is certainly indicated now that past field failures with pyrethrum as a spring aphicide may have been misleading, for in this modern work each emulsion gave complete control of aphids at both stages of application, green cluster and pink bud. With unsprayed trees, Cox variety, flower trusses were 59% infected. Further work to evaluate pyrethrum in low volume spraying is now being carried out.

Active esters. Other work on pyrethrum in the new Rothamsted Report[2] indicates that the active esters in pyrethrum extract may be separated by using a wiped film molecular still. The conditions for obtaining a pale-coloured distillate containing 60-70% of pyrethrins were determined; some waxes and other inert materials were also present; the undistilled residue contained less than 10% of pyrethrins.

Biological activity. In other Rothamsted work[3] the biological activities of reconstituted and natural constituents of commercial pyrethrum extracts have been compared; the relative toxicities to houseflies were:

Commercial pyrethrum extract	1·0
Pyrethrin II	1·5
Pyrethrin I	1·0
Cinerin II	0·5-0·6
Cinerin I	0·4-0·5

The concentration of the different active constituents in pyrethrum extract was determined chromotographically. The toxicity of the extract agreed well with an estimated value based upon the above individual toxicity measures, thus indicating that the different constituents act additively and not antagonistically or synergistically. This hypothesis was also supported by making mixtures of the four active constituents, estimating toxicity and then determining it.

Synergists. The idea that synergists enhance the toxicity of pyrethrins because they help to reduce the breakdown of pyrethrins by light has been experimentally tested by ultra-violet irradiation and biological assay.[4] Under these conditions the addition of a synergist, piperonyl butoxide, did not prevent or reduce loss of pyrethrins' toxicity caused by light, and it is concluded that " if stabilisation occurs at all, it probably does so to a very limited extent." Cases of reported stabilisation are explained on the assumption that the film's life is prolonged because of the increase in ratio of synergist to pyrethrins, the latter being progressively degraded by light, and that the film's apparent retention of toxicity is simply because the insects concerned were susceptible to the synergists.

Resistance. Insect resistance to pyrethrins has been shown to be possible.[5] A field strain of the grain weevil was found with twice as much resistance as standard strains to pyrethrins in oil solution. In five years of selection pressure breeding, a far more resistant strain has emerged, finally with 18 times the standard strain's resistance.

Eelworm control

In the 1959 Report from the West of Scotland Agricultural College more progress on a field scale with potato eelworm control by yellow oxide of mercury has been reported.[6] A new and better carrier has been developed, a vermiculite carrier which has proved dustfree in operation. Control has been found to be increased the longer the time given for applications to act, and as control has been poorer for shorter-growing second early potatoes, it is now thought best with such crops to give the treatment 33 days before planting. Now a number of experiments have shown that the best control performance for both potato root eelworm and club root is given by 2½ lb. of mercury equivalent per acre, and this is only half the rate originally indicated by pot experiments.

Results so far accumulated are said to show that the yellow oxide of mercury control is the best of all methods known at present. It will give a 75% control for soils whose maximum population is 1·2 cysts per gram. If soils with higher populations are treated, the mercury method reduces populations to a level at which maximum production of new cysts can occur, and no increase in crop yield therefore results.

Apple fungicides

Particularly in high rainfall areas apple canker prevents healthy growth of trees, notably of dessert varieties. Old cankers in trees are a major cause of fresh spore infections. Spraying has not on the whole been found as reliable a remedy as the laborious method of cutting out old cankers. Experimental work with susceptible rootstocks has recently been reported[7] and it has been indicated that a spraying programme can greatly reduce apple canker incidence.

The programme calls for two copper sprays in autumn, the first before main leaf-fall starts, the second when about half the leaves have fallen. One further spraying in

Model A seed treater, supplied by Shell Chemical Co. and designed especially for use with *Panogen* and *Astex*, the first liquid seed dressings to be marketed in this country.

An advantage of the machine is that the operator does not need to wear a face mask.

the spring is advisable, especially in areas of high spring rainfall. If a severe epidemic already exists, however, the spraying programme for control still needs supplementation by excision of old cankers during the winter. Ferrous sulphate was also tried, but it was less effective than Bordeaux type copper sulphate sprays.

A seven-years study of damage to certain apple varieties by arsenic, copper and mercury sprays has been reported.[8] Varieties were Cox's Orange Pippin, Worcester Pearmain and Laxton's Superb. Arsenic was applied as lead arsenate, zinc fluorarsenate and aluminium arsenate, and for the first year only, as sodium arsenate. Copper was given as Bordeaux mixture, mercury as phenylmercuric chloride. Sodium arsenate scorched leaves of all varieties badly, but the effect on yield varied from almost total loss with Cox's to no significant loss with Laxton's. But with other arsenic sprays, leaf damage and fruit damage were not as serious, lead arsenate causing some damage in only one year, and in a different year there was damage with the other two arsenical sprays. Consistent damage was caused by Bordeaux mixture, with leaf spotting and apple russeting in all years; loss of yield was consistent with two varieties but not with Laxton's. Phenylmercuric chloride caused leaf spotting and fall with all varieties in one year, and in another year Cox's suffered fruit loss; in these cases wet weather had followed spraying.

Seed treatment

Modern liquid seed treatment for disinfection—*e.g.* the *Panogen* process—has been studied for distribution of mercury by new and improved chemical methods.[9] Former investigations with radio-labelled mercury are considered less valuable, for the amount of fungicide on the seed kernel is determined only for that part of the kernel facing the Geiger tube window, approximately one-sixth of the kernel surface. The new chemical method has permitted total mercury assay of individual seed kernels. However, the results by the new method did not differ more than slightly from the results of the radioactive method, at any rate when considered statistically. It is concluded that a reasonably uniform distribution of mercury is obtained in both laboratory and commercial treatment irrespective of treatment conditions and liquid dosage. This is due to the vapour action involved in the *Panogen* process. It is shown to be useless to judge mercury distribution by the evenness of distribution of any dye simultaneously used. Any appearance of dye uniformity is governed by the amount of dye used—this has no connection with the mercury distribution which occurs quite differently.

New fungicides?

Preliminary screening studies with homologous symmetrical and unsymmetrical trialkyl phosphorotetrathioates have shown that some of the shorter homologues may be more fungitoxic than standard commercial fungicides.[10] An example is trimethyl phosphorotetrathioate. In agar-plate tests with eight different mycelia inoculates, all initially isolated from plant hosts, some ten of the phosphorotetrathioates gave results at least comparable with and sometimes better than results given under similar conditions with phygon, captan, ferbam and terrachlor. Obviously further investigations are required.

Derris persistence

Although derris insecticides are still much used, little work is published about them. It has long been known elsewhere that derris and lonchocarpus insecticides speedily lose activity after being sprayed. Two days of active life have been found for derris spray deposits in Japan; five days is a period found in some U.S. studies. Little has been done to ascertain the rate of toxicity loss of derris spray deposits under British conditions.

New work carried out in the field in 1959 has been reported from Long Ashton.[11] Blackcurrant bushes were sprayed to run-off state in July; circular leaf discs were taken. It was found that under conditions of bright sunlight and high temperature, toxicity was quickly lost—and also if rain followed spraying. In two experiments when these conditions occurred there was no residual activity after two days (sunlight) and after three days (rain). There may be persistence of toxicity for about a week on plants in the field if dull and cool conditions, free from rain, follow spraying.

Non-selective herbicide

The high phytotoxicity of a dipyridyl quaternary salt has already been reported[12]—I-I′-ethylene-2,2′-dipyridylium dibromide. This compound proved to be quick acting, desiccating and top-killing a wide range of plant species. Applications to the soil, however, produced no effect on plants, this being due to soil adsorption by ion exchange mechanism. Uptake by plant roots is toxic if it occurs, for this has been shown by adding the compound to culture solutions, when rapid plant death took place. The usefulness of

this chemical as a herbicide, or of others of its class, lies in the fact that its rapid and general toxicity as a foliage-contact spray is not likely to be associated with residual effects in the soil. A new paper[13] has studied the mode of action of this class of potential weedkiller. The same activity is not shown at all by diquaternary salts of 2,3′- and 3,3′-dipyridyl; it is exhibited by certain 2,2′-, 2,4′- and 4,4′- dipyridyl salts. There is a relationship between this phytotoxic activity and the redox properties of the compounds. Those that are active must be considered to be so by virtue of their redox properties. These active compounds seem to be reduced in the plants by processes connected with photosynthesis and plant respiration. That is to say, if a compound of this chemical class is to be herbicidal, it must be capable of reversible reduction to free radicals stable in aqueous solution. The reduction in the plant seems based upon energy derived from light, but some activity can occur in the dark, though this is of lessened power.

Systemic insecticides

In the summer of 1959 the cabbage aphid severely attacked many brassica crops. It is reported[14] that previously successful systemic insecticides were very limited in securing control. Apart from general reports, this lessened effectiveness was experimentally confirmed at the National Vegetable Research Station, Wellesbourne, for kale and Brussels sprouts. At best only a partial control was given, and this was largely due to direct contact rather than systemic action. It is suggested that warm and dry conditions such as those of the 1959 summer greatly reduce the efficiency of systemic action. The actual experimental results with sprouts showed that control over aphids was so limited that populations quickly recovered and within 20 days of spraying had reached former levels or even exceeded them. It is also suggested that the warm dry summer weather increased the waxy covering of the leaves, which gave additional interference with the normal mode of systemic action.

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INTERNATIONAL COSMETOLOGY (THE MUNICH CONFERENCE) (*Continued from page* 447)

apparatus for maintaining an animal in a closed system at constant temperature and measuring its CO_2 evolution, O_2 uptake, mobility and N_2 excretion. The CO_2 is measured automatically and the result fed into an electrolytic cell producing an equivalent amount of oxygen. All figures are continually recorded and plotted.

Experiments to date had largely been for standardising, but some had been carried out in which the effect of royal jelly (5 g./kg. orally) were studied. There was no influence on body weight, but there was an increase in protein oxidation.

14. *Dr. R. Brun*—"*Experimental depigmentation*"

He has examined 29 substances in vivo on animals (guinea pigs with pigmented nipples) including quinones, phenols, NDGA, antioxidants, hydroxybenzoates, malonic acid, phenyl thiourea and azides. Most were irritant or sensitisers, especially hydroquinone monobenzyl ether which is known and used for depigmentation. The monomethyl ether, however, appeared to be even more active yet not a sensitiser. He made some interesting deductions as to the mechanism of action of the hydroquinones.

15. *W. Colburn*—"*Assay of lyophilised placenta extract*"

Phosphatase is used as an indicator, not for its own significance but because it is thought likely to be equally sensitive to destruction as any active principle. Full details of the method were given.

17. *J. Poprzan*—"*Inactivation of preservatives by non-ionic emulsifiers*"

This is one of a series of nine papers and dealt with the effect of alcohols and polyols on the inactivation of methylparahydroxy benzoate by a particular non-ionic "G.3720," using three test organisms, *A. niger*, *Ps. aerogenosa*, *B. subtilis*.

In the alcohol series from methyl to *n*-butyl, 5% of the alcohol was used with 2% non-ionic. Only *n*-butyl had bacteriostatic properties alone, but all from ethyl to *n*-butyl were effective in the presence of the paraben. Of the polyols, out of dipropyleneglycol, 1:3 butanediol, 1:4 butanediol, 1:5 pentanediol and 1:2:6 hexanetriol, only pentanediol was effective at 5% with paraben. At 15%, 1:3 butanediol and pentanediol were effective even without the paraben.

Hair

18. *Dr. F. Keil*—"*The swelling of hair in cold waving agents—investigation in polarised light*"

Hair behaves anisotropically in polarised light and observed normally to its axis shows interference colours. Penetration of liquids can be recognised by changes in these colours. Dr. Keil presented a wonderful series of slides showing the behaviour of hair in various relevant liquids.

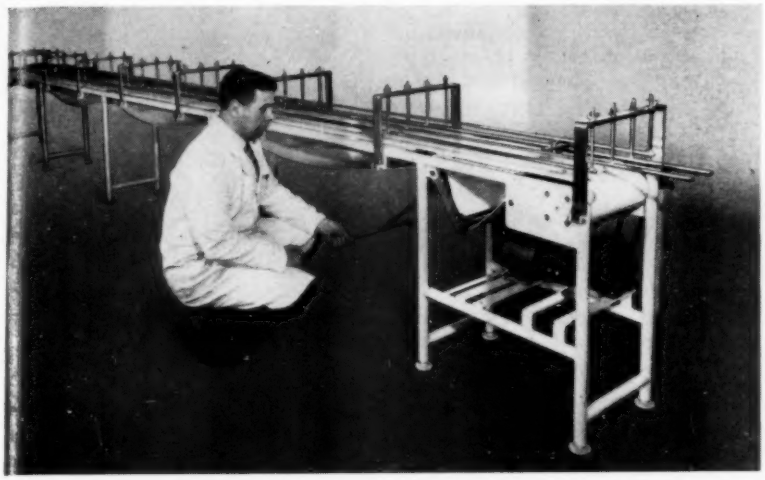
19. *Dr. H. Freytag*—"*The physical and chemical behaviour of human hair*"

He dealt with two phenomena—hygroscopicity and solubility. In studying hygroscopicity he applied test methods from the wool industry to hair and wool treated by bleaching, perming, alcohol extraction, etc., and found *p*H not to be a critical factor.

Solubilities were examined in urea/bisulphite, acid and alkali. When hair and wool were first dried at 105°C., solubility dropped. Tips of wool behaved differently from the shafts, especially after bleaching, presumably because of light and physical damage.

20. *Dr. H. Wilmsmann*—"*Measurements on the spectral influence of oxidative dyeings*"

The use of the Zeiss Elrepho reflectance spectrophotometer was the basis of this paper.



The Farrow and Jackson belt conveyor with quick release snubbing roller device which allows additional belt length to become available.

▶ROTARY WET GRANULATORS

Where formulations contain a high percentage of sugar or other soluble material such as extracts, granulation is difficult to obtain as the product tends to adhere to the machine and blind the screen.

The Apex *No. 52* rotary wet granulator is designed to handle these sticky or waxy materials and will usually produce firmer and stronger granules than those produced by other methods, as well as giving high production throughput. This granulator will also handle plastic materials, including those of a waxy nature.

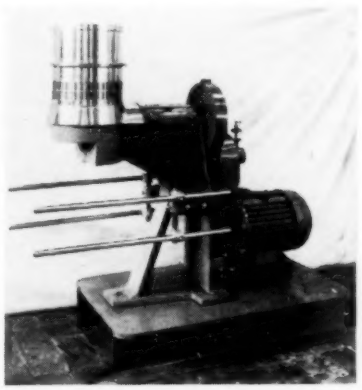
The *No. 52R* granulator produces granules by extruding material through a vertical perforated screen. The screens are fitted in the bottom portion of a stainless steel hopper which is in two halves. The screens are easily interchangeable and are available with holes from $\frac{3}{64}$ in. up to $\frac{1}{4}$ in. diameter. The material is pressed through by a multi-armed spreader, being fed to the spreader by a feeder arm. A stainless steel shroud is fitted over the cast iron housing below the screen to discharge the granules, and tray supports are fitted so that the granules can be collected for drying. The spreader and the feeder are rotated on a vertical shaft in opposite directions. All parts in contact with the material are in stainless steel or monel metal.

The granulators are self-contained units complete with motor drive and are available in two sizes. The smaller size has an output based on sugar of 300 lb./hr. whilst the larger size has an output of 1,800 lb./hr.

▶EASY-TO-CLEAN CONVEYOR

Farrow and Jackson Ltd. have introduced a form of quick belt release conveyor that can be cleaned under the belt or on the skid plates without stopping the main drive.

A quick release snubbing roller, with additional belt length, has been introduced at the drive end. A quick release handle moves the snubbing roller to allow additional belt length to become available on the line, thus allowing the belt to be lifted high on the carrying strand, or the return strand to be pulled downwards, anywhere along its length for cleaning and wiping down.



***Model 52RB* rotary wet granulator made by Apex Construction Ltd.**

The conveyor illustrated is fitted with a double faced white P.V.C. plastic belt (although other types can be supplied according to requirements) running over raised Dural skid plates $\frac{1}{8}$ in. thick. The complete guide rail system is formed of $\frac{1}{2}$ in. diameter stainless steel rails with removable and adjustable stops fitted across the lanes.

The guide rails are supported from mild steel bridges, cadmium-plated and passivated, and having vertical adjustment above the belt. The complete guide rail system and bridges hinge back through 90°, in sections, for ease of access.

There are no exposed butting rails, the sections being held and covered by sleeves shaped so that there is no hindrance to the passage of the product.

▶OVENS AND INCUBATORS

The latest Hearson oven satisfies the requirements of B.S.2648 and is constructed with an outer case of mild steel and an inner lining of first quality stainless steel. Internal dimensions are 15 in. × 15 in. × 18 in. high. Temperature control is by means of the new hydraulically operated compensated thermostat giving a high degree of control. Temperature range up to 200°C. Two adjustable shelves are provided.

The *Quadrate Combined Oven and Incubator* is another model with internal dimensions 12 in. × 12 in. × 11½ in. high. The inner lining and outer case are of mild steel welded construction with fibre glass insulation. Temperature range of up to 60°C. for use as a biological incubator and up to 200°C. as an air drying oven; it is thermostatically controlled. Temperature fluctuation ±0·75°C. over the whole range. The oven has two removable wire grid shelves.

The Hearson *Water Bath* has internal dimensions of 18 in. × 12 in. × 7½ in., with a liner manufactured from a corrosion-resistant stainless steel with matt satin finish. The effective temperature range is from room temperature to 100°C. and incorporation of the new hydraulic thermostat ensures accuracy within ±0·5°C. Additional extras include a gabled cover, cooling coil and

racks each holding 36 tubes 3 in. × ½ in. A flat cover with slots is also available for knife sterilisation.

▶SUPER CORROSION RESISTANCE

Nucerite is a new Pfaudler family of ceramic-metal composites which combines structural strength and resistance to impact damage with outstanding resistance to attack in hot corrosive environments, according to Enamelled Metal Products Corporation (1933) Ltd.

It is claimed that *Nucerite* has unique advantages in increasing the rate of chemical reactions which are at present retarded by the lack of a material that will withstand corrosive attack at high temperatures.

It is not anticipated that it will replace any current corrosion-resistant; rather it will expand the scope of applications for ceramic-steel materials.

Pfaudler engineers report that in one of its formulations, the new material has resisted attack by corrosive vapours at 1,300°F., a temperature that would destroy most metals in a few moments under the same conditions, and it is expected that even this temperature will be exceeded by several hundred degrees. In aqueous environments, its resistance to corrosion is superior to most metals.

In the laboratory, the product contact surface of *Nucerite* has successfully undergone the following tests:

Impact Strength: The ceramic component withstood 9 ft. lbs. of point impact force or approximately eighteen times of that needed to shatter safety plate glass.

Tensile Strength: The ceramic component withstood more stress without permanent deformation than did mild steel.

Thermal Shock: It showed a 300% to 400% increase in resistance to damage by thermal shock over existing glassed metals—ΔT of 1,200°F.

Abrasion: The resistance to abrasion was 400% greater than that of laboratory glass.

Heat Transfer: This was six to ten times better than other ceramic materials that would be used in high temperature corrosive services.

High Temperature Stability: Has protected molybdenum from oxidation at 1,600°F. in an oxy-acetylene flame.

According to Pfaudler *Nucerite* is chemically bonded to steel and to heat resistant metals such as Inconel and Hastelloy in the same manner as its existing glasses. Because of the nature of some anticipated applications, it is probable that certain reactive metals, such as tantalum, niobium (columbium) and molybdenum—which maintain strength at elevated temperatures—will also serve as base metals.

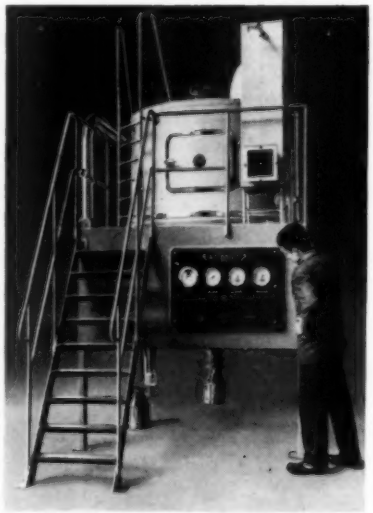
The unique characteristics of the new material are said to be the result of closely controlled nucleation and crystallisation within certain ceramic formulations.

▶MOLECULAR DISTILLATION

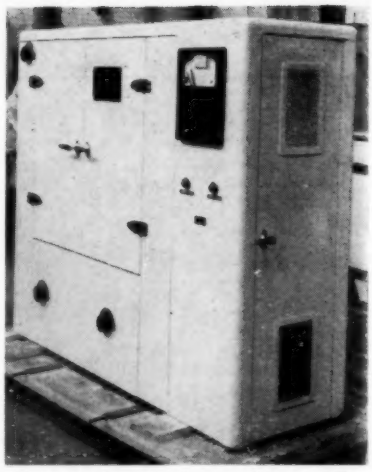
George Scott and Son (London) Ltd. have entered into a new agreement with Arthur F. Smith, of Rochester, N.Y., U.S.A., for the manufacture and sale of molecular distillation equipment of commercial size, with heating surfaces from 4½ sq. ft. upwards.

The Scott-Smith molecular still, which operates at very high vacuum with the lowest possible heating temperature and very short contact time, is particularly suitable for distillation, purification and deodorising of heat-sensitive materials of relatively high molecular weight, like vitamins, hormones, sterols, plasticisers, etc.

Scotts have already installed a prototype plant with a 12 in. diameter still in their new research and development centre at Leven, Fife, where tests have been started on various materials.



The Babcock-Ramm atomiser for producing powders from liquid concentrates.



Mitchell VS drying cabinet: The cabinet has been designed to accommodate 10 trays 32 in. × 16 in. × 1¼ in. deep at 3 in. spacing giving a volumetric capacity of 3 cu. ft. and an effective tray area of 35 sq. ft.

Efficient door seals are fitted to ensure freedom from air leakage. Comprehensive instrumentation is included with indicating controllers for steam or electric heating, all instruments being located in a separate cubicle for ease of maintenance.

Variable air velocities are obtainable through a single control.

▶POWDERS FROM LIQUIDS

Babcock and Wilcox are introducing to Britain new equipment for the evaporative processing of food, chemical and other products, from liquids into concentrates and powders. This equipment is to be manufactured in this country, under licence, exclusively by Babcock and Wilcox Ltd., under the name of Babcock-Ramm.

The Babcock-Ramm atomiser has wide application to the production of powders from edible, chemical and pharmaceutical liquids or fluid concentrates.

With this machine, a liquid or a fluid concentrate is fed to an ultra high-speed atomising turbine surmounting the hygienic, stainless-steel drying chamber. Converted into a fine mist of microscopic particles, the material is dried, by heated air, into a powder, which is extracted under controlled temperature conditions, with the aid of cyclone separators.

For more information about the plant and equipment described please use the coupon on page 464

Kosmetologie

By Dr. J. S. Jellinek. Alfred Huthig Verlag, Heidelberg, 1960. *Pp.* xx+621. *DM* 40 *net.*

THIS German book is on the pattern of Harry's volumes on cosmeticology (currently being revised) and Sagarin's *Cosmetic Science and Technology*. It is an exhaustive treatment of the science of cosmetics and their formulation in the light of the great array of new raw materials now available.

It is in two parts. In the first the following subjects are dealt with: skin and hair, surface-active agents, microbiological aspects of cosmetics, and formulation. In the second part cosmetics are considered by function, *i.e.* cleansing, deodorising, protection, hair care and decoration.

No important aspect of a vast subject has been overlooked and on the whole work Dr. Jellinek has brought to bear a critical treatment invaluable both to the beginners and to experienced chemists. Hundreds of formulæ are given and there is an appropriately exhaustive index. Dr. Jellinek has performed a service to German speaking cosmetic chemists and has produced a book that can stand beside its English and American counterparts.

Drugs of Choice 1960-61

Editor: Walter Modell. C. V. Mosby, St. Louis, 1960. *London, Henry Kimpton. Pp.* 958. 101*s.* 6*d. net.*

THIS large and exhaustive book contains 42 chapters, most giving advice on the selection of drugs for specific conditions—viral conditions, anæsthesia, dermatology, poisoning, etc. The editor contributes the first chapter and discusses the principles of the choice of drugs. Physical and chemical considerations in choosing drugs comes next. Then follow the chapters on the pattern indicated, each written by doctors specialising in the particular conditions. The first *Drugs of Choice* appeared in 1958 and a two-year interval has been decided on for revisions. There are eight new chapters in the new volume and in order to provide fresh insights three chapters are written by new authors. The total of contributors stands at 47. A single, alphabetically arranged, all-inclusive drug index is used in this edition in preference to the separate, specialised lists of drugs which followed the individual chapters in the original book. This occupies 100 pages and is followed by a 43-page index. It should thus be easy to find one's way about this large volume.

Scientific Words

Their Structure and Meaning. By W. E. Flood. Oldbourne. London, 1960. *Pp.* 220. 18*s. net.*

DR. FLOOD uses an immediately intelligible system to explain the structure and meaning of scientific words. He has selected about 1,150 word elements (roots, prefixes and suffixes) which enter into the formation of scientific terms and explains their meaning with examples to illustrate their use. Thus, aldehyde is a contraction of *alcohol dehydrogenatum* and its use is illustrated with formaldehyde, benzaldehyde and so on. *Butyrum* (Latin) means butter, hence butyric acid and the related compounds butane, butylene and butyl. *Hydat* (Greek) means water and we learn that sometimes it denotes liquids in general and in chemistry it often denotes hydrogen (water producer—the Latin *genit* (to beget) providing the suffix). Of course, most of the roots are Latin or Greek because at the beginning of modern science the natural philosophers used the classical languages. They did not always make a good choice. Lavoisier erred when he coined oxygen (acid-producer), not realising that not all oxides are acidic and that not all acids contain oxygen. According to Dr. Flood he would have been more accurate to have called it hydrogen.

But many scientific words are modern. *Mycin* is a suffix denoting substances produced from fungi (aureomycin, chloromycin, etc.). Strepto (from the Greek *streptos*—twisted) means a chain with a beaded or twisted appearance.

Whatever the word, the root is almost certain to be found in this well-compiled book which provides clues to the understanding of thousands of scientific terms. The great merit of the book is that it leads to understanding through a fascinating chain of deduction. Classical scholars, of course, will hardly need its help; they should already be able to understand scientific language. But for the great majority of readers the book will be handy as a reference and fascinating to browse through. It can be thoroughly recommended.

Applied Organic Chemistry

By E. Kilner and D. M. Samuel. Macdonald and Evans Ltd. 1960. *Pp.* 500, *illustrated.* 50*s. net.*

THIS book contains 24 chapters dealing in the main with manufacture and use of heavy and fine organic chemicals.

As a supplement to existing textbooks on organic chemistry, intended to emphasise the industrial aspect, it perhaps falls rather short of its final object, but nevertheless a good deal of the subject matter will be of considerable value to the student of modern chemistry — particularly those undergoing industrial training as part of their curriculum.

In the early chapters the descriptive work on petroleum and the related industries opens up a new vista in what has too often become a closed book to the student of organic chemistry. Petrochemicals should have been given much more space, as the demand for knowledge of these is now considerable. Halogen derivatives tend to be catalogued in small paragraphs with insufficient detail—no mention is made of vinyl bromide and its important applications.

There are many important omissions, *e.g.* production of perchloroethylene by gas-phase chlorination of light hydrocarbons at 500° to 650°, and production of typical organo fluorine compounds—now becoming increasingly important—*e.g. Fluothane.*

One would also like to have seen more space devoted to the terpene alcohols with some reference to new developments in the synthetic field.

Among the aliphatic alcohols,

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glycerol deserves more than a paragraph, and its wide application merits as much space at least as pentaerythritol.

The acids and their derivatives are well described and the industrial processes for the derivatives are given in reasonable detail.

In Chapters 10, 11 and 12 an attempt is made to conclude the aliphatic section by description of protein products, oils, fats, waxes, carbohydrates, etc. The authors rather boldly define fats as glyceryl esters, when in point of fact all such are mixtures of simple and mixed glycerides, highly complex, but having constitution following certain natural laws. The paragraph on analysis of fats is most misleading—acid, saponification, iodine and Reichert Meissel values being only a fraction of modern technique in this field. The layout here is also rather confusing; it would have been much better to have first classified fats and oils, including drying oils, and then given some up-to-date methods of expeller extraction and details of refining processes.

Soap-making and fatty-acid production would follow, and in this connection some space should be devoted to production of long-chain fatty acids. Thus the section on drying oils might well be transferred to the first section on oils and fats and some information on the manufacture of polymerised oils would have been welcome. The brief references to paints, varnishes and lacquers might well be eliminated in favour of more information on synthetic waxes—their nature, their production and the technique of analytical procedure. Detergents might have been dealt with in a chapter by themselves.

In the second part of the book the authors have adopted the conventional separation of aliphatic and aromatic compounds of industrial importance, and generally the industrial aspects—including manufacture and application—are well detailed.

High polymers including addition and condensation polymers are probably fitted in conveniently towards the end, being derived from aliphatic as well as aromatic groupings, and the authors in 50 pages provide a valuable summary of plastics materials, adhesives, surface coatings, etc. Possibly paints, synthetic resin emulsion paints, etc., described in Chapter 11 could have been conveniently included here—even if not all truly polymeric.

The chapter on colour, dyes, textile printing, etc., is thorough and up to date; advances in phthalocyanine pigment technology, for example, and their importance is clearly recognised; in the anthraquinone dyes, the newer blue wool dyes, brighter in shade and of better fastness, are given some prominence. It would have materially helped the student, however, if still more stress could have been laid on those dyes recently produced by improved syntheses and some indication given of their particular value. Few students may turn to the " Reports on Progress of Applied Chemistry " and the authors would render a service if references from these reports were more widely quoted.

Finally, it is a pleasure to read a book of this type on applied organic chemistry and Messrs. Kilner and Samuel are to be congratulated on their pioneer effort. The text provides a valuable link between study of fundamental organic chemistry and the wide and ever-increasing accumulation of knowledge in the applied field. The diploma in technology student should read this book and will gain much from the factual knowledge of important processes so often omitted from the more academic texts.

J. H. SKELLON.

Industry's Publications

Cosmetics, soaps, pharmaceuticals, polishes, froths and foams are among the classified sections of the latest " Digest " issued by Croda Ltd. The digest contains many useful formulæ and hints on formulation culled from 29 literature sources, all of which are cited to facilitate further reference.

Purchasing in Europe. The European Federation of Purchasing, which consists of the professional organisations of buyers in industrial and public undertakings in Belgium, France, Germany, Netherlands, Norway, Sweden and the United Kingdom, has published the proceedings of its Second European Purchasing Conference held in Holland in April 1960, under the title " Purchasing in Europe."

This 108-page publication is printed in three languages, English, French and German, and contains all the papers given at the Conference in their original language, with summaries in the other languages.

Copies may be obtained at 5s. each from European Federation of Purchasing, 146A Queen Victoria Street, London, E.C.4.

Soda and chlorine. Murgatroyd's Salt and Chemical Co. Ltd. have published specifications for their products in a new booklet. The products are caustic soda, liquid chlorine, salt, sodium hypochlorite, hydrochloric acid and compressed hydrogen.

Titanium. I.C.I. titanium is being increasingly used in chemical plant. Examples of its use in a wide range of plant and equipment are given in a new booklet.

Surface activity. *Creto*, a cationic surface-active material which is a quaternary ammonium compound but non-bactericidal, is the subject of a specification booklet from Croda Ltd. It can be used as an emulsifying agent, anti-static, softening agent for textiles and dyestuff auxiliary.

Storing petroleum. Authoritative advice on the storage of petroleum spirit and petroleum mixture is given in a new booklet from the Fire Protection Association.

Vitreous enamelling on glass containers is an attractive way of calling the attention of the public to a product. In view of the interest in this type of decoration the Glass Manufacturers' Federation has issued a leaflet giving briefly the history of the development of vitreous enamelling and its application.

Coal tar chemicals produced by the Gesellschaft für Teerverwertung are listed in a new catalogue available from their sole U.K. agents, Jacobson van den Berg and Co. (U.K.) Ltd. A number of new chemicals have been added to the GfT range.

CHRISTMAS PACKS

Three of the hundreds of attractive Christmas packs now making their appearance in the shops. Left: A festive looking pack containing three bars of Pears transparent soap, the lid of which can be clipped off and hung to show the calendar attached. Centre: Imperial Leather after-shave lotion and shaving bowl. Right: Glamorous ensemble for Coty skin perfume.

Film about foil

Three years ago the colour film " All That Glitters " was made at the works of Fisher's Foils Ltd. of Wembley to show how aluminium foil is produced for the packaging trade. It presented to the public for the first time the complete process of manufacture, from the casting of the aluminium rolling slabs to the completed foil in all its many finishes, illustrating, also, how it is applied to retail packaging.

The film had its premiere at the London Pavilion and was exhibited on the Rank circuit of cinemas throughout the country. There may yet be some companies that have not seen this film. It is available free on loan, upon either 35 or 16 mm. stock. Applications should be made to Fisher's Foils Ltd., Exhibition Grounds, Wembley, Middlesex.

Glass for car chemicals

One attractive glass container has replaced the variety of packs previously used for the range of chemical products for motorists manufactured by the Granville Chemical Co. Ltd. of Keighley, Yorks.

New 6 oz. wide-mouthed amber jars fitted with black *Korkalite* caps are being supplied by United Glass Ltd. for each of the nine Granville products.

The tins previously used by Granville for most of their range deteriorated rapidly because of the condensation and fumes in many garages and changes of temperature in filling station kiosks. There was also the danger of rust causing seepage from seams and pinholes.

A new uniform range of amber-coloured glass containers (left) has replaced the variety of packs (right) previously used by Granville Chemical Co. Ltd. for their motorists' products.

Labelling ideas

This latest Sellomation pocket information booklet has been published by Gordon and Gotch (Sellotape) Ltd. As in the companion booklets, emphasis is on ideas rather than advertising for the products concerned. After introducing the technique, the text covers a wide range of uses for the self-adhesive label in factory, office and shop. Continuous strip and die-cut labels are defined and dealt with and dispensing methods shown.

For manufacturers examples are quoted of production line labelling, quality control, stock coding, marking of flaws in material, etc., as well as contents identification in packaging, grading in stock ranges and of course branding.

Corks since 1844

Changes in corks, stoppers and closures during the past 116 years have been observed at first hand by C. Olley and Sons Ltd., of Camperdown Street, London, E.1. Olley's have been making corks since 1844 and are one of the oldest firms of their kind in the world. They still make corks of all types and sizes and in addition today make the latest closures in metal and plastic, including screw-top caps. They have a wide range of closures to offer from stock and will also make to customer's own designs.

Improved aerosol can

John Dale Ltd. are producing aerosol containers (2 oz. and 2½ oz. capacity) with the neck rolled outward instead of inward. With one-piece aerosol cans with necks rolled inward, internal lacquering of the formed container could not be done to ensure 100% coverage of the metal surface on the inside of the curled neck. A similar problem arose when anodising the can for decorative effect to ensure the complete absence of chemical deposit on the inside of the curl during drying operation following the anodising process. As a result of these difficulties the possibility of corrosion could never be entirely ruled out.

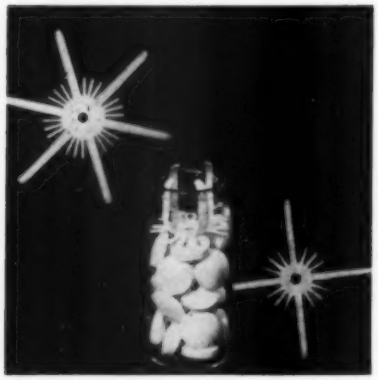
Self-adhesive carbon

By coating one side of *Carbion* resilient packaging material with a latex solution a new system of packing has been developed. The special process has been developed by Spicers Ltd., who also make and market the material.

The main application of this new material is the protection of small parts. Much time and labour is often spent on packing spare parts, accessories, small tools and similar items. These are now merely placed on a piece of self-adhesive Carbion, the piece is folded over and firmly pressed down along the edges and around the enclosed parts which are immediately held securely in an envelope of convenient shape. To remove the parts, the seal is pulled apart. The material can be used several times. The latex does not adhere to any surface, unless it also has a coating of latex.

Testing hazards to packages

A special test case with compact electronic equipment to record mechanical shocks in handling and transport of packages was suggested at the First International Conference of Packaging Research Institutes. Information on cushioning and journey hazard has now reached the stage of practical usefulness. Theoretical predictions still need practical checks, but recent reports show that the cushioning requirements predicted by calculation are within 20% of the experimentally determined values.



The Swedish "Cerbo Star" device made of polythene for packing the headspace of tablet containers. Mention is made of this on page 424.

Fly-spray packs redesigned

An entirely new design was worked out by the Metal Box Co., for O-Cedar fly-spray containers, to give all four a family likeness. They are printed directly on the tinplate by the offset lithographic process. The colours are blue-green with white lettering, and yellow with black print. The contrasting backgrounds are separated by a ribbon of white.

The packs are all established and proven Metal Box ones. The aerosol is capped with the new aluminium top, which both protects the valve and streamlines the container. The spray refills, in 8 and 16 oz. sizes, are two of the company's oblong range for liquids. They are internally soldered and carry print all round.

Universal Metal Products' crush test performed on collapsible tubes to test the enamelling before they are put into production. The tube is first submitted to extremes of temperature and varying humidity before it is crushed and opened out again. The enamel should not flake, crack or rub off.

Packaging corrosive materials in Vermiculite

The hazards of shipping bromine—particularly those of uncrating bottles which may have been shattered—have been lessened with the introduction of vermiculite packaging. Also, the use of vermiculite has in itself resulted in fewer breakages.

A large proportion of the bromine imported by users in the U.K. comes from the Israel plant of Dead Sea Works Ltd., who produce in the region of 3,000 tons in a single year. At one time, Dead Sea Works packed bromine bottles in ash or kieselguhr—a diatomaceous earth. But because of the great distances involved in shipping and long overland journeys often involved, it was decided to adopt vermiculite exclusively as a packaging material.

The company found that vermiculite is more than 25% lighter than any other packaging material they have used for bromine. Because of its shock-absorbing qualities, vermiculite considerably reduces the risk of breakage, but in the event of a breakage it is capable of absorbing the spilled bromine.

On packing, the vermiculite immediately works its way into the corners of the crate and into any irregular spaces around the bottles.

Some 50 tons of exfoliated vermiculite a year are being used by Boots Pure Drug Co. Ltd. for the packaging of corrosive and inflammable materials.

"Green Water" by Jacques Fath which is being distributed in this country by Cullingfords. The plastic safety coating is disguised with a brilliant green "suedette" finish, set off with a gold cap and label. Two other perfumes are similarly packed: Fath de Fath in black and Iris Gris in grey. They sell at 37s. 6d.

Polythene lined paper sacks

The latest *Palfsacks* made by William Palfrey now contain an inside ply of polythene coated paper. This protects them against contaminants, moisture, escape and odours and also prevents scuffing and acid attack by the contents.

A variety of sizes, shapes and colours of sacks are available. They can be filled, handled and emptied easily and also take up less storage space.

Sharp rise in I.C.I. profits

Increased interim dividend

I.C.I.'s half-yearly statement shows that group sales in the first half of the year rose from £250 million in 1959 to £288 million in 1960, and that profits before tax increased from £33,966,000 to £50,935,000. The size of these increases is all the more remarkable as they were achieved in the face of an average reduction of 2% in the home selling prices of the company's main products.

The net profit after tax increased by £7,600,000 to £27,600,000. The interim dividend paid is 6¼% and the company will repay the £20 million 4% unsecured loan stock maturing on December 31.

Throughout the first half of this year most plants were operating at high output, generally close to capacity, and the resulting reduction in unit costs has contributed largely to the rise in earnings.

Export sales have shown a highly satisfactory further expansion; the f.o.b. value of I.C.I. exports from the United Kingdom for the first half of 1960 was £47,300,000 compared with £41,300,000 for the first half and £46,200,000 for the second half of 1959.

B.H.C.'s £10m. project

British Hydrocarbon Chemicals Ltd. plan a major extension of manufacturing activities in South Wales. While no capital authorisations have yet been approved, initial investment may well be about £10 million.

For nearly ten years the company has been engaged in the petrochemicals industry at Grangemouth, receiving feedstocks mainly from the adjacent refinery of the British Petroleum Co. Ltd. These feedstocks are converted by cracking and further processing, into chemicals serving as raw materials for other industrial processes. The range and scope of production of B.H.C. has increased more than five-fold since the original operation started, and expansion continues.

B.H.C.'s proposed site, of several hundred acres, will be within a short distance of the BP refinery at Llandarcy, near Swansea, and the general pattern of operations can be expected to follow that at Grangemouth. B.H.C. is jointly owned by BP and the Distillers Co.

Exploitation of Lacq sulphur

The discovery at the foot of the Pyrenees of one of the world's greatest deposits of sulphurous gas has transformed within a short period of years an agricultural French province into a thriving industrial community. The discovery has supplied a new source of fuel in quantities large enough to stimulate the entire French economy.

Associated with the exploitation of the gas, Société Nationale des Pétroles d' Aquitaine have constructed the world's largest sulphur plant at Lacq, placing France as one of the world's largest producers of sulphur, coming next, with Mexico, to the United States. At present 175m. cu. ft. of gas are treated each day. In 1961, when the gas fields will be working to the full, at a rate of 700m. cu. ft./day of gas, about 1,400,000 tons of sulphur will be produced each year.

K. W. Chemicals Ltd., London, who have been granted exclusive concessions in the United Kingdom as stockists and grinders, have concluded partnership agreements for these concessions with W. Blythe and Co. Ltd., Accrington.

New catalytic plant

Humphreys and Glasgow Ltd. have been awarded a contract for the installation of an Onia-Gegi catalytic reforming plant at the Partington works of the North Western Gas Board.

The plant will be built in two sections and completed in January 1962. Output is designed to be 12m. cu. ft./day of town gas, but substantial overload capacity will be built in.

Feedstock is refinery gas from an adjacent petrochemical works at the rate of 60,000 th./day. Alternatively there is provision for using liquefied petroleum gases as standby.

Evans buy wholesalers

Evans Medical Ltd., Liverpool, have acquired the whole of the share capital of J. Gilbert Jackson Ltd., wholesale chemists, Sheffield.

For the time being the company will continue to trade under the name J. Gilbert Jackson Ltd., 56 Ellin Street, Sheffield (telephone number Sheffield 20039). Mr. W. R. B. Sheldon has been appointed managing director.

J. Gilbert Jackson Ltd. were incorporated in 1913 to acquire a retail business founded in 1896. They started trading as wholesale chemists in 1935.

Darchem Engineering Ltd.

The British Refrasil Company Ltd., Stillington, Co. Durham, one of the principal subsidiaries of Darlington Chemicals Ltd., has changed its name to Darchem Engineering Ltd. Ownership and board of the company remain unaltered and all existing activities will continue.

Marine water treatment service

Albright and Wilson (Mfg.) Ltd. have arranged that the servicing and supplying of their marine water treatment customers will in future be handled by the Atlas Preservative Co. Ltd., Erith, Kent. This covers the Hall system of boiler water conditioning which has been operated in the U.K. for many years past by Albright and Wilson (Mfg.) Ltd., who will continue to control its operation. The arrangement will also cover the application of Hagevap LP and the recently introduced H-400 scale solvent.

The Atlas Preservative Co. Ltd. have operated for many years in the marine field on descaling and degreasing equipment of all types.

Marchon extend fatty alcohol plant

An extension is to be made to the Marchon Products Ltd. fatty alcohol plant at Whitehaven which will increase its capacity by more than 50%. The Marchon plant, which is the only hydrogenation unit in the United Kingdom making higher molecular alcohols, has been in production in the C_8/C_{18} range of fatty alcohols for some years. The new extension is due to come into operation before the end of 1960.

Bayer move

Bayer Products Ltd.—a member of the Winthrop group of companies—have moved their offices from Kingston-on-Thames to: Winthrop House, Surbiton-upon-Thames, Surrey.

The telephone number—Kingston 7733—remains the same.

New offices for Walker, Crosweller

Walker, Crosweller of Cheltenham, manufacturers of Leonard thermostatic mixing valves, Unatap spray taps, and Arkon instruments, have opened a new office block in the town. This houses their sales and service departments, which retain the old telephone number (Cheltenham 56317) and address. Departments at the factory (accounts, works offices, buying and publicity) have a new number: Cheltenham 56366.

Union Oxide move

Union Oxide and Chemical Co. Ltd. have moved to new offices. Their new address is Union Oxide and Chemical Co. Ltd., 6 Eldon Street, London, E.C.2. (Telephone: Bishopsgate 6741. Telegraphic Address: Unichem, Stock, London.)

Manufacturing chemists buy site

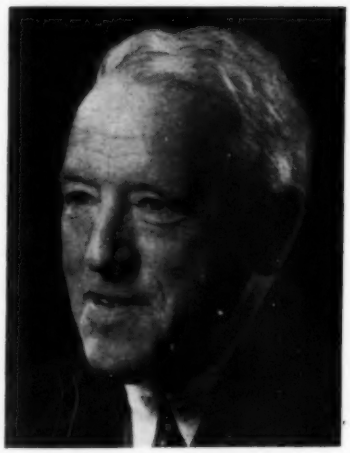
W. C. Evans and Co. (Eccles), Ltd., manufacturing chemists, Chadwick Road, Eccles, Lancs., have acquired a site for the erection of a factory at Warton, Lancs.

Sir Alexander Fleck to open the Corrosion and Metal Finishing Exhibition

SIR ALEXANDER FLECK, K.B.E., D.SC., LL.D., F.R.S., President of the Society of Chemical Industry, will open the Corrosion and Metal Finishing Exhibition to be held in the Empire Hall, Olympia, London, from November 29 to December 2.

The opening ceremony will take place at 11 a.m. on Tuesday, November 29. The Exhibition is at least twice as big as the first Corrosion Exhibition, held in 1957, and it is now probably the world's largest display of anti-corrosion and metal finishing products and services. So far as is known it is the only one of its kind in Europe. One of the new features of this year's Exhibition will be technical meetings arranged by the Plastics Institute and by the Corrosion Group of the Society of Chemical Industry. There will also be technical films dealing with various aspects of corrosion and metal finishing.

Tickets for the Exhibition can be obtained free by trade visitors by writing to the Organisers, 9 Eden Street, London, N.W.1.



Sir Alexander Fleck.

Sir Alexander Fleck, who retired from the chairmanship of I.C.I. early this year, has had a distinguished career in British industry and has been widely honoured. He started his working life as a "lab" boy at Glasgow University and by 1913 he had his own research laboratory as Physical Chemist to the Glasgow and West of Scotland Radium Committee.

He joined the Castner-Kellner Alkali Co. Ltd. (later to become a part of I.C.I.) in 1917. By 1931 he had risen to be managing director of I.C.I.'s General Chemicals Division. Six years later he was appointed chairman of I.C.I. (Fertilizer and Synthetic Products) Ltd., the predecessor of the Billingham Division of I.C.I.

Sir Alexander joined I.C.I.'s main board in 1944 and became a deputy chairman in 1951. He was chairman of the company from June 1953 until his retirement.

In 1958 he was President of the British Association.

Sir Alexander's many public services include the chairmanship of the Committee that reviewed the organisation of the coal industry in 1953 and the chairmanship of the three Committees which, in November 1957, commenced an investigation of the accident at the Windscale establishment of the Atomic Energy Authority. Shortly afterwards he was appointed to the chairmanship of a Government Committee formed to enquire into the British Fishing Industry. He is also chairman of the Scientific Advisory Council of the Ministry of Power and a member of the Advisory Council on Scientific Policy.

Alcan Industries

Northern Aluminium Co. Ltd. have changed their name to Alcan Industries Ltd.

This new name involves no change of ownership, manufacturing activity or sales policy, its purpose being to identify the company more clearly as a member of the Aluminium Limited of Canada group.

Carriage of dangerous goods

Amendment List No. 4 to the 1957 report of the standing advisory committee on the Carriage of Dangerous Goods and Explosives in Ships revises and brings up to date the Committee's recommendations for carrying dangerous goods and explosives by sea. New packings have been included for many of the substances listed in the report, and other changes in the entries have been made; some substances are now dealt with for the first time.

This list is now available from H.M. Stationery Office, price 11s. 6d.

The amendments to the Explosives Section will be included in a new edition of the document "Rules for the Packing, Stowage and Labelling of Explosives for Carriage by Sea," which is being reprinted in loose-leaf form. The publication date of this booklet will be announced later.

Fire at Marchon

Fire broke out in the fatty alcohol distillation at Marchon Products Ltd., Whitehaven, Cumberland, on September 5, as a result of which distillation equipment was damaged. There were no injuries caused by the fire.

Water treatment

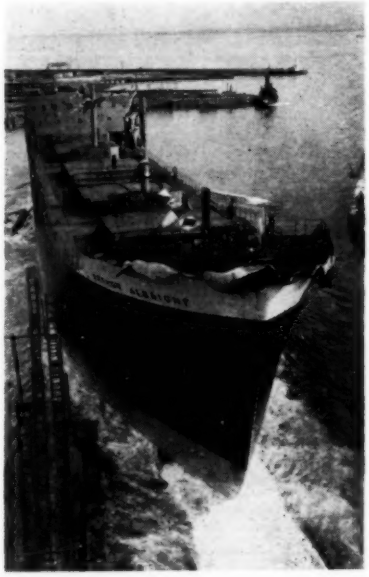
Among recent contracts carried out by the Neckar Water Softener Co. Ltd. was the Supply to the Steel Company of Wales Ltd. of a multi-stage deionisation plant, having a capacity of 20,000 gal. per hr., with ultimate extension to 40,000 gal. per hr. Another was for Reed Board Mills (Colthrop) Ltd.; it comprised a low-pressure dosage by pump with automatic control to treat a flow rate of 6,000 gal. per hr., also phosphate injection for four water tube boilers working at 250 p.s.i. For Wiggins Teape and Co. Ltd., the company supplied an acid and melamine handling, mixing, storage and circulating plant; circulating load 200 gal. per hr.

A.P.V.-Sivyer agreement

A licensing arrangement has been reached between the Sivyer Steel Casting Co. of Milwaukee, Wisconsin, U.S.A., and A.P.V.-Paramount Ltd. of Crawley, Sussex, whereby the latter, a subsidiary of the A.P.V. Company Ltd., is to manufacture and sell Sivyer refinery fittings in Europe and in the British Commonwealth.

Bulk phosphate rock carrier

On September 5 Mrs. S. Barratt, wife of the Albright and Wilson chairman, performed the naming ceremony at the launch of the m.v. Arthur Albright. Built at the Firth of Forth yard of the Burntisland Shipbuilding Co. Ltd., the vessel, which has been especially designed to dock at the Portishead, Somerset, factory of the group, is suitable for loading ports at Tampa Range (Florida) and elsewhere. After trials in late December the 10,000 ton carrier will make her maiden voyage early in 1961.



Albright and Wilson's new phosphate carrier m.v. Arthur Albright.

D. C. Garratt, PH.D., D.SC., F.R.I.C., has been elected chairman of the British Pharmaceutical Conference for 1960-61 and will preside at the meeting of the Conference to be held in Portsmouth during the week beginning September 18, 1961. Dr. Garratt is chief analyst to Boots Pure Drug Co. Ltd., Nottingham, and is in charge of the company's standards department. He was drug analyst for the London County Council for a number of years, and from 1939 to 1948 was public analyst to the Borough of Camberwell and a consulting chemist. He was also analyst to the Port of London Authority. He serves on the British Pharmaceutical Codex Revision Committee and two of its subcommittees, and is chairman of one of these. He also serves on the British Veterinary Codex Committee and is chairman of one of the sub-committees. Dr. Garratt is an examiner for the fellowship in Food and Drugs and in Pharmaceutical Analysis of the Royal Institute of Chemistry; he is also a vice-president of the council of the Society of Analytical Chemistry, and is chairman of its Analytical Methods Committee. His book " The Quantitative Analysis of Drugs " is widely used by analysts.

After directing for many years the organic chemical research of Ilford Ltd., **Dr. J. D. Kendall** has been appointed director of the European research laboratories of the Minnesota Mining and Manufacturing Co. Ltd., London. His first assignment will be the development of new graphic products. A permanent location for the new laboratory has not as yet been selected and it may be either in England or on the Continent. Dr. Kendall will work under **Dr. Carl E. Barnes,** 3M Co.'s vice-president for research, who works at the firm's HQ in St. Paul, U.S. Dr. Kendall is the immediate past-chairman of the Fine Chemicals Group, Society of Chemical Industry. His many friends will wish him well in his new post.

The Balfour group of companies have appointed **C. J. Grayston,** M.I.CHEM.E., as group research director of their recently opened research and development centre at Leven, Fife. One of Mr. Grayston's duties will be to supervise the Student and Graduate Apprenticeship Schemes which are now functioning within the group. Mr. Grayston has spent a lifetime in the Scott organisation and is a director of George Scott and Son (London) Ltd. and Ernest Scott and Co. Ltd.

The new Minister of Health, **J. Enoch Powell,** has appointed **Marcus J. Worsley,** M.P., to be his Parliamentary Private Secretary. Mr. Powell succeeded **Mr. Walker-Smith** in July.

R. P. Scherer

Dr. J. D. Kendall

C. J. Grayston

I. Throndsen

Dr. D. Matheson has been appointed H.M. Senior Chemical Inspector of Factories, in place of **S. H. Wilkes,** who retired recently.

Dr. Matheson, 57, was educated at Robert Gordon's College, Aberdeen. He joined the Inspectorate in 1931, and transferred to the specialist engineering and chemical branch in 1938. He has been deputy to the Senior Chemical Inspector since September 1957.

R. P. Scherer Jnr. has been appointed chairman of R. P. Scherer Ltd., Britain's largest manufacturers of gelatin capsules. This appointment is made at a moment of considerable company expansion, with the installation of an extensive new plant.

Other members of the board of R. P. Schere Ltd. are: J. A. MacKenzie, managing director, S. B. Bowerman, R. J. Dale, R. J. Clough.

After completing his four year assignment as managing director of Chemstrand Ltd., manufacturers of *Acrilan,* **A. L. Davies** has returned to the U.S.A.

Changes in the board of Howards of Ilford Ltd. are announced as follows:

- **J. A. E. Howard** to be chairman;
- **E. W. M. Fawcett** and **H. P. P. Hodgkins** to be joint managing directors;
- **W. A. Levick** and **R. C. Patrick** are appointed to the board of directors.
- **T. W. Howard** remains on the board of Howards of Ilford Ltd. and continues as chairman of the holding company Howards and Sons Ltd.

Head of the transport and warehouse department of Glaxo Laboratories Ltd., Greenford, **C. E. Dixon** has received a gold watch marking 40 years' service with the company, which he joined as an accounts clerk. Mr. Dixon is a past chairman of the London Division of the Industrial Transport Association of which he is a Fellow.

Carnegies of Welwyn Ltd. announce that **R. W. Unwin** has relinquished his appointment as sales manager.

D. F. Haydon has been appointed general sales manager of Baird and Tatlock (London) Ltd. He joined the company in 1932, and gained experience in the various commercial departments of the organisation before becoming chief technical sales representative in 1952.

General John E. Hull, President of the U.S. Manufacturing Chemists' Association Inc., will be the principal guest at the annual dinner of the Association of British Chemical Manufacturers at Grosvenor House, London, on Wednesday, October 12.

The British Association of Chemists has awarded the Hinchley Medal for 1959 to **L. E. Puddefoot,** and it has been arranged that the presentation will take place this autumn. On this occasion Mr. Puddefoot will deliver the Hinchley Memorial Address.

Anthon Bakker has been appointed sales representative in Belgium, Denmark and Holland of the Pyrethrum Board of Kenya. Mr. Bakker will operate from Brussels. **R. H. McLellan** will remain the European technical sales representative of African Pyrethrum Technical Information Centre Ltd.

Dr. F. H. Netter, a leading medical artist, has signed a new ten year contract with Ciba Pharmaceutical Products Inc. This will assure the completion of a 20 year Netter project of painting 20,000 colour illustrations of every significant part of the body and diseases that affect it. Dr. Netter is working on the third of the nine volume series, which is called " The Ciba Collection of Medical Illustrations."

The Royal Society announces that **Dr. G. Jones** of the Rowett Research Institute, Bucksburn, Aberdeen, has been appointed to hold the Sophie Fricke Royal Society Research Fellowship in the Rockefeller Institute for the academic year 1960-61. He will be working on the fractionation and characterisation of leaf proteins.

A. D. Berk has retired from the board of F. W. Berk and Co. Ltd., having completed 55 years' service with the company. He was appointed chairman in 1942. **C. H. Tanner** has succeeded him.

D. Shuttleworth recently with the chemical division of the Distillers Co. Ltd. at Hull, has joined Maconochie Bros. Ltd., the food manufacturers, as technical manager. He will operate from the factory at Hadfield, Derbyshire, and will be responsible for quality control and general engineering.

Prof. E. E. Turner, F.R.S., who has retired as Professor of Chemistry in the University of London, Bedford College, has joined Biorex Laboratories Ltd., as director of research. A new research laboratory is to be opened shortly in City Road, London, E.C.1.

Dr. R. H. Marriott, F.R.I.C., retired after 20 years' service from County Laboratories Ltd. (Beecham Group) on September 30. He intends to occupy his spare time as a consultant, working from his private address, 20 Pine Grove, London, N.20. He is the immediate past chairman of the Society of Cosmetic Chemists.

Stafford Allen and Sons Ltd. have appointed **John Bailey** as their Midland area representative.

Obituary

We regret to announce the death of **F. J. Beech**, managing director of the Fluid Equipment Co. Ltd.

We regret to announce the death of **I. Throndsen,** chairman of Johnsen and Jorgensen Ltd. Mr. Throndsen was born in Norway and came to London in 1890 at the age of 17 and joined his uncle in the firm of Johnsen and Jorgensen Ltd. In 1900 he became managing director and in 1940 chairman.

In 1950 King Haakon VII conferred upon him the Order of St. Olav, First Class.

We regret to announce the death of **G. R. Nicholas,** the discoverer of *Aspro*, at the age of 76, in Melbourne. He was a founder of Nicholas Pty. Ltd.

At the outbreak of the first World War the Australian government offered sole manufacturing rights to anyone who could discover how to make aspirin, then a German patent. Mr. Nicholas eventually evolved *Aspro* and in collaboration with his brother, A. M. Nicholas, built up an international pharmaceutical organisation.

Distillers' new division

The Distillers Co. Ltd. have formed a development division in its Industrial Group under Dr. H. M. Stanley as Controller, who will be located at 21 St. James's Square, London, S.W.1. The following appointments have also been made:

Mr. C. E. Hollis, Manager, Central Research Department, Great Burgh, Epsom, Surrey.
Mr. G. P. Armstrong, Manager, Licensing Department, 21 St. James's Square, London, S.W.1.
Dr. H. W. Ashton, Manager, Planning Department, 21 St. James's Square, London, S.W.1.

The main responsibilities of this Division will be the direction and co-ordination of the company's research, forward planning and licensing activities, particularly in chemicals and plastics.

Chemical control of road verges

The effects of chemical treatment on roadside grass verges have been studied this summer by interested bodies in a series of visits to trial plots at Bibury in Gloucestershire. Plots have been sprayed for the past six years with grass growth regulator and a selective weedkiller, and the tests have proved so satisfactory that it has not been found necessary to cut the verges for the whole of this period.

The active growth inhibiting agent is maleic hydrazide made by Whiffen and Sons Ltd. To achieve maximum efficiency it is first converted into a soluble derivative and then formulated to allow adequate spreading and absorption when sprayed on to grass.

As the active ingredient of *Regulox*, maleic hydrazide is already widely used, very often in association with *Vergemaster*, a selective weedkiller. Many authorities have found that this treatment shows substantial savings against cutting, collecting and carting away mown grass.

Visitors this summer also had an opportunity of seeing the effects of a new combined regulator, a single spray which retards growth of the grass and removes weeds at the same time.

Three advantages are claimed for this new combined mixture. It is easier to store, it is not subject to operator control, and timing of the actual application is no longer such a critical factor. Penetration of the new mixture is so rapid that even a heavy rainfall six hours after application has no adverse effect on efficiency.

Organisers of the visits were Baywood Chemicals Ltd., distributors of the chemical treatments, in association with Whiffen and Sons Ltd.

Macfarlan and T. and H. Smith form sales company

The boards of J. F. Macfarlan and Co. Ltd. and of T. and H. Smith Ltd. have decided to form a new private company, Macfarlan Smith Ltd. The issued capital will be £100,000 and the registered office and head office of the new company will be at Wheatfield Road, Edinburgh, with the London sales office at 4 Carlos Place, London, W.1.

Macfarlan Smith Ltd. will be responsible, at home and overseas, for the sales in bulk of the fine chemicals alkaloids and anæsthetics manufactured by either of the parent companies and commenced trading on October. All enquiries and orders for these products should now be addressed to Macfarlan Smith Ltd. in Edinburgh. Urgent orders may be telephoned to the London sales office by customers of either company in the south of England, whence they will be teleprinted for immediate attention in Edinburgh. All export orders will be dealt with at the head office.

The medical specialty products such as sutures, lignocaine, etc., and the non-pharmaceutical products of J. F. Macfarlan and Co. Ltd. will continue to be sold by that company and orders should be addressed to 109 Abbeyhill, Edinburgh 8.

J. F. Macfarlan and Co. Ltd. and T. and H. Smith Ltd. will be responsible separately for accounts due as at September 30, 1960.

The directors of the new company are: D. Rainy Brown, N. Rainy Brown, A. Forsyth, J. A. Hiddleston, P. Mackenzie and R. H. Mathew, and sales staff and representatives of both parent companies concerned with bulk sales have joined the staff of the new company.

A new trade mark, letterheads, labels and literature have been designed.

Arthritics benefit from gold injections

A controlled trial organised by the Empire Rheumatism Council has shown that gold injections for rheumatoid arthritis have a beneficial effect. 200 people in different parts of Britain suffering from arthritis were divided into two groups, one of which was injected over a course of 20 weeks with 1 g. of gold solution, and the other given similar injections but only containing a minute amount of gold.

Results showed that the gold-treated group had made a greater degree of improvement than the control, although skin reactions were troublesome in a significant number of gold-treated cases.

Titanium is cheaper

Imperial Chemical Industries Ltd., Metals Division, announce further major reductions in the basic prices of their wrought titanium. The cuts, affecting deliveries after November 1 next, range from 15% for rod, extrusions and commercially pure sheet to 10% for plate, wire and alloy sheet. Examples of the new prices are 1 in. plate 49s./lb. and 20 gauge alloy sheet 135s./lb.

More factory accidents

The Chief Inspector of Factories states in his annual report that the number of fatal accidents declined from 665 in 1958 to 598 last year, but the total number of accidents rose from 167,697 to 174,071. The total increase is explained by the rise in industrial production during 1959 and the fact that more people were employed.

An analysis of the causes of accidents shows that the largest number (26·2%) occurred through the handling of goods. Over 19% were caused by machinery, over 15% by persons falling, and nearly 8% in each case through the use of hand tools, being struck by falling bodies, and through stepping on or striking against objects.

Annual Report of the Chief Inspector of Factories, 1959 (7s.), Guide to Statistics (4s.), Report on Industrial Health (3s. 6d.), are all available from H.M. Stationery Office.

Company finance

Vitamins Ltd. Group profit after tax for the year to March 31, 1960, fell to £129,280 (£177,129). The chairman, H. C. H. Graves, said the decline was due to a writing down of stocks at a cost of over £100,000 owing to unparalleled shipments of raw materials from a hitherto little regarded source in South America which seriously depressed the protein market. This, he hoped, would be a non-recurring item.

John and E. Sturge Ltd. have declared a second interim dividend of 3% less tax, for the year ending December 31 payable October 31, 1960.

THE CHEMICAL MARKET

This Month's Changes

LONDON.—**Potassium sodium tartrate** in 5 cwt. lots is up £1 to £11 cwt. **Silver nitrate** is down by $\frac{5}{16}$d. to 5s. $1\frac{13}{16}$d. oz. **Zinc oxide** B.P. in 2 ton lots dlvd. is up £2 10s. to £112 10s. cwt.

Amongst the oils, **palm oil** refined, deodorised, in 2 ton lots naked ex-works, is down £1 to £102 ton, and **palm kernel oil** refined, deodorised, in 2 ton lots naked ex-works, is down by £5 to £118 ton.

In gums and waxes, **agar agar** No. 1 Kobe strip is up 3d. to 17s. lb. **Candelilla** spot is down 5s. to £24 5s. cwt. **Carnauba** prime spot is down 10s. to £39 cwt. and fatty grey is down £1 to £28 10s. cwt.

Other prices include: **dimethyl sulphate** in 3 cwt. lots 1s. 11d. lb. **Ascorbic acid** in 100 kg. lots £3 6s. 6d. kg. **Acetic acid** in 1 ton lots dlvd. 80% tech. £99 ton, 80% pure £105 ton, glacial B.P. £114 ton, 99-100% glacial £111 ton, and 98-100% glacial £108 ton.

Bismuth salts in 1 cwt. lots, carbonate 20s. lb., subgallate 19s. 3d. lb., salicylate 19s. 9d. lb., and subnitrate 18s. lb.

THE TECHNICAL PRESS IN OCTOBER

Twenty-one Years of "Petroleum"

THIS month is the 21st anniversary of **Petroleum,** the international journal of the oil industry. Special features in this historic issue include "Development of Refinery Engineering in Europe and the U.K.," "Past and Future: The Economic Impact of Oil," and "Twenty-one Years of Refining Developments." There is also a review of new equipment and processes for insulation in the petroleum industry.

Chemical and Process Engineering publishes a special feature on pressure vessel design and construction. There is also a chemical engineering review of drying. Polyethylene is discussed in the series on materials of construction for chemical plant.

Corrosion Technology reviews corrosion in the aircraft industry as a special feature. There are two articles —"Corrosion Problems in the Aerospace Industries" and a review of the Farnborough Air Show, which describes some of the new metals and anti-corrosion exhibits at the show. The recent corrosion symposium at Birmingham is reported with particular emphasis on the protection of gas plant and equipment.

There is also an interesting article on "Corrosion Resistant Cements and their Applications."

A topical article, "Silicon Photocells to Utilise Solar Energy," is featured in **Automation Progress.** This journal also includes "The Automatic Control of Domestic Space Heating" and "Millimicrosecond Computing."

Among the articles in **Fibres and Plastics** are "Chemical Constitution and Methods of Dyeing Polyamide Fibres," "Pigments for PVC, Lino and Pitchmastic Tiles," "Vinyl in Floor Coverings" and "Manufacture of Felt-based Linoleum Tiles."

The first part of "Carbon Black Dispersions" is published in **Paint Manufacture.** Other important articles include "Dispersion of Micronised Pigments with Impeller Equipment," "Micronisation of Titanium Dioxide" and "Silicones in Hammer Finishes."

The October issue of **World Crops** is a special number dealing with agricultural machinery and implements. Special articles include "Improved Ploughs for Dryland Farming," "Flax in Canada," and "Tree Pruning in Californian Orchards."

Dairy Engineering features a preview of the Dairy Show. Other articles of interest are "Whey Utilisation through Propagation of *Saccharomyces fragilis*" and "Time-Temperature Treatment in Autoclaves."

A special review of the Brewing, Bottling and Allied Trades Exhibition appears in **Food Manufacture.** There is also an interesting article, "Microscopical Techniques." Two reports deal with processed foods for cats and dogs, one of which describes Spratt's cannery at Wisbech.

Polak and Schwarz change name

Polak and Schwarz (England) Ltd. has changed its name to International Flavours and Fragrances I.F.F. (Great Britain) Ltd.

Society for Applied Bacteriology

The annual meeting of the Society for Applied Bacteriology was held in Bangor recently. The following are now officers of the Society. Hon. president, Mr. G. Sykes; hon. secretary, Dr. Ella M. Barnes; hon. treasurer, Mr. G. Elis Jones; hon. editors, Dr. S. E. Jacobs and Dr. D. J. Jayne-Williams; hon. publications manager, Mr. A. H. Walters; hon. advertising manager, Mr. E. J. Mann. Members of committee, Dr. Eve Billing, Mr. N. J. Butler, Mr. B. M. Gibbs, Dr. N. D. Harris, Dr. J. R. Norris, Dr. Jane Meiklejohn, Dr. A. M. Paton, Dr. Joan Taylor, Dr. G. C. Ware (*ex officio*), Dr. C. A. E. Briggs, Mr. D. A. McKenzie.

Stainless steel plant

The A.P.V. Co. Ltd. have acquired an interest in the business of Stainless Steel Plant Ltd., of Cleveleys, near Blackpool, which has been fabricating plant and equipment in stainless steel for several years.

The management will remain and the company will continue to operate as before.

Union Carbide's new H.Q.

Union Carbide Ltd., have moved their head office to Union Carbide House, 8, Grafton Street, London, W.1. The headquarters of the chemicals, alloys, polyethylene and Kemet divisions will also be in this building.

Part of the large Union Carbide international organisation, Union Carbide Ltd. was formed in 1954 and now operates alloys plants at Sheffield and Glossop, a polyethylene plant at Grangemouth, a Kemet plant (manufacturing electronic components) at Aycliffe, while the chemicals plant at Hythe, Hampshire came on stream early this year.

High purity As, Sb, Te, and Bi

Johnson, Matthey and Co. Ltd. are now producing very pure arsenic, antimony, tellurium and bismuth on a commercial scale.

Using new techniques, arsenic is being produced with an impurity level of the order of 1 p.p.m., detected by use of present known and accepted spectrographic methods. The element is in the form of crystalline lumps and is packed in vacuum-sealed glass tubes.

News from Abroad

UNITED STATES

Dieldrin poisoning

The committee on toxicology of the American Medical Association has issued another report in its series on the health hazards of pesticides entitled "Occupational Dieldrin Poisoning." Reprints of this report may be obtained from the Committee on Toxicology, American Medical Association, 535 Dearborn St., Chicago 10, Illinois, U.S.A.

BRAZIL

Unilever takeover

The negotiations between Unilever and Companhia Gessy Industrial S.A., the Brazilian manufacturers of washing products, toilet preparations and edible oils, have been satisfactorily concluded. Gessy is now, like S.A. Irmaos Lever, a Brazilian subsidiary of Unilever and it is likely that they will later be integrated into one company—Gessy Lever S.A.

It is hoped to retain the identity of each company's products.

EGYPT

New pharmaceutical factory

When a new pharmaceutical factory now under construction near Cairo begins production next year, it will make use of 40 Hungarian patents for the manufacture of medicines.

The factory is being built according to plans pr[illegible] Hungarian engineers.

SOUTH AFRICA

Pharmaceuticals from seaweed

A company has been formed to manufacture a range of pharmaceuticals from South African seaweed extracts. It is called CX (Pty.) Ltd., and obtains its raw materials—*Ecklonia maxima*—from Sea Plant Products (Pty.) Ltd., of Cape Town, who for some years past have been exporting milled seaweed for industrial purposes from 11 factories situated on the South African seaboard. *Ecklonia maxima* is now being refined and converted into rheumatism powder and tablets, eczema lotion and other natural sea remedies.

Drug monopolies discounted

The chairman of the Heller Organisation, speaking at the inauguration of the Pietersburg, Transvaal, wholesale branch of South African Druggists Ltd., said that rumours that the firm was aiming to establish monopolistic conditions within the pharmaceutical trade were not true. "It should be realised that 80% of our purchases for resale are made from agents and manufacturers in South Africa who have complete jurisdiction over their own price structures. This fact must dispel any thoughts of our ability to create a monopoly." He said that modernisation of the Lennon production plant at Port Elizabeth, which supplied South African Druggists, was aimed at developing self-sufficiency for South Africa in pharmaceuticals manufacture.

Cattle skin diseases

Lumpy skin disease and elephant skin disease both cause great economic loss to South African cattle farmers. The mortality rate is relatively low in both cases, but loss of condition and milk production, sterility in bulls and irreparable damage to hides loses millions of pounds annually. There are two forms of lumpy skin disease which are caused by two entirely different viruses. The severe form is caused by the Neethling-type virus. A mild form of lumpy skin disease is caused by the Allerton-type virus. It is not known exactly how these viruses are transmitted in nature.

Experience has shown that vaccination is the only satisfactory method of control. An effective vaccine against the severe form of the disease has been developed at Onderstepoort veterinary research laboratory. The vaccine can be used at any time of the year on all animals over the age of six months.

Antibiotic expansion

Pfizer of America is expanding its activities in South Africa. The operations of its local proprietary division will cover the whole Union instead of only the Transvaal and Northern Free State as hitherto. Also a feeds blending plant has been commissioned in Johannesburg for the manufacture of supplementary antibiotic and vitamin feeds for farmers and feed manufacturers.

Research on animal parasites

At the Onderstepoort veterinary research laboratory and various other centres, experiments are being undertaken into some of the new remedies for cattle and sheep diseases. The drugs belong to the group of organic phosphate insecticides and have the trade names of *Neguvon* and *Asuntol*. The identical compounds, under other trade names, have been used in South Africa for the past five years or so as insecticides in orchards and elsewhere, and in dips against ticks and blow fly. Neguvon has given favourable results in cattle against wireworm (*H. placei*) and nodularworm (*O. radiatum*). If the dosage is increased bankruptworm (*Cooperia spp.*) and hookworm (*B. phlebotomum*) may be controlled, but in some cases symptoms of poisoning may be noted. Asuntol is effective against wireworm, nodularworm and bankruptworm, but has no effect on hookworm in cattle. This drug is unfortunately much more toxic than Neguvon. It is not necessary to pre-dose with 10% salt or bicarbonate of soda solution before administering either of these remedies to cattle. When dosing sheep it is essential that the animals are predosed with 10% copper sulphate solution and the remedies administered thereafter within a period of 30 sec. Both Neguvon and Asuntol have proved to be highly effective against wireworm (*H. contortus*) and Asuntol in addition is effective against bankruptworm (*Trichostrongylus spp.*). If the two drugs are combined in the proportion of ten parts Neguvon to one part Asuntol, brown stomach worm (*Ostertagia spp.*), long neck bankruptworm (*Nematodirus spp.*) and hookworm (*B. trigonocephalum*) can also be controlled. Unfortunately both these drugs are highly toxic. Sheep are particularly susceptible, particularly if they are in poor condition, running on dry veld or suffering from liver damage. The symptoms of Neguvon poisoning appear soon after dosing, within an hour or two, but those of Asuntol are delayed from one to even five days. Neguvon is now generally recommended in South Africa for cattle and the combination of Neguvon and Asuntol has a wider range of efficiency against sheep parasites than either drug alone.

AUSTRALIA

Reichhold change name

Reichhold Chemical Industries (Australia) Ltd. proposes to change its name to Australian Chemical Holdings Ltd. The company's nominal capital is to be doubled to £6m. However, the name of the main subsidiary, Reichhold Chemicals Inc. (Australia) Pty. Ltd., will be retained.

Detergent output up

Australian production of detergents in the first 11 months of 1959-60 totalled 701,800 cwt. compared with the 621,800 cwt. of the previous corresponding period. Detergents for personal use rose from 9,200 cwt. to 11,400 cwt.; for household use from 495,000 cwt. to 567,000 cwt.; and for industrial use from 120,600 cwt. to 123,400 cwt.

Salt works opened

Central Queensland's Salt Industries Ltd.'s new works and refinery at Bajool, 26 miles south of Rockhampton were opened recently. The works cover 460 acres including the salt pans which are situated on top of an underground basin of rich brine.

The company is now producing all types of salt, including one special product of blocks of salt for livestock purposes.

Polyethylene output increase

Union Carbide Australia Ltd. is to double the capacity of its polyethylene plant now under construction at Altona, Victoria. The capacity will be expanded from 15m. lb. to 30m. lb. a year. The first stage of the plant will be in production by mid-1961.

COLOMBIA

Bayer plan pharmaceutical manufacture

Farbenfabriken Bayer, of Leverkusen, West Germany, recently started the construction of a manufacturing subsidiary in Colombia. The subsidiary—Bayer de Colombia Ltda.—is planned to start the manufacture of pharmaceuticals early in 1961. Its chief products will be sulphonamides and aspirin.

INDIA

New chemical factory

A consortium of West German companies is to build a chemical factory near Bombay, under an agreement signed between the Indian Government and the four members of the consortium—Bayer, Badische Anilin, Hoechst and Friedrich Uhde.

The factory, which is to cost about DM35m. (£3m.) will provide the basis for developing a pharmaceutical and plastics industry in India. The German companies, as well as building the factory, will send scientists and technicians to run it.

Alcohol production

Production of industrial alcohol in India is expected to rise from 20m. gal. at present to 50m. gal. in 1965, which will make India one of the largest industrial alcohol producers in the world.

In addition to the manufacture of acetic acid, acetone and several organic chemicals based on alcohol, it is proposed to manufacture synthetic rubber based on alcohol and benzene.

NEW ZEALAND

New copper plant

Imperial Chemical Industries of Australia and New Zealand Ltd. (ICIANZ) and Yorkshire Imperial Metals Ltd. of Leeds, U.K., plan to build a plant for the manufacture of copper and copper alloy sheet, strip and tube. Capital of over £(NZ)2m. will be required, and it is expected that an ICIANZ subsidiary company will be formed in New Zealand to conduct manufacturing operations. The arrangement is still subject to ratification. The plant is likely to be in the Auckland area.

JAMAICA

Toothpaste plant

Colgate-Palmolive Ltd. plan to manufacture dental cream in Jamaica for the West Indian market by the end of this year. A two-storey extension to the company's plant which will add 16,000 sq. ft. of manufacturing and warehouse space is being built.

MEXICO

Naarden subsidiary

A subsidiary company of N.V. Chemische Fabriek "Naarden" has been established in Mexico under the name Naarden de Mexico S.A.

The new enterprise will engage in the manufacture of flavours and perfume compounds for Mexican industry. In addition, arrangements have been made for the production of the food preservatives benzoic acid and sodium benzoate in co-operation with Salicilatos de Mexico S.A.

MEETINGS

Pharmaceutical Society

October 20. "The suitability of paperboard containers for dispensing tablets," by S. C. Jolly, and "Examination of a number of dispensing balances," by G. Smith. 7.30 p.m. 17 Bloomsbury Square, London, W.C.1.

Institution of Chemical Engineers

October 10. Symposium on surface effects and liquid behaviour. 3 p.m. The Royal Institution, Albemarle Street, London, W.1.

October 12. "Fundamental considerations in biological treatment of effluents," by A. L. Downing and A. B. Wheatland. 6.30 p.m. Midland Hotel, Birmingham.

October 25. "Computers and their application in chemical engineering," by D. W. Holman and J. J. Settle. Chemical Engineering Lecture Theatre, Manchester College of Science and Technology, Jackson Street, Manchester.

November 1. "Prediction of ternary data from binary systems," by E. Evans. 7.30 p.m. Blossoms Hotel, Chester.

Royal Institute of Chemistry

October 11. "Synthetic fibres," by C. A. Finch. 6.30 p.m. Brighton Technical College.

October 20. "Some chemical aspects of colour photography," by G. I. P. Levenson. 6.30 p.m. S.E. Essex Technical College, Longbridge Road, Dagenham.

October 25. "Some observations on analytical chemistry," by J. Haslam. 7 p.m. Medway College of Technology, Maidstone Road, Chatham.

October 27. "Some aspects of ion exchange," by C. W. Davies. 6.30 p.m. Borough Polytechnic, Borough Road, London, S.E.1.

Fertiliser Society

October 27. "The design of void spray towers for silicon tetrafluoride absorption," by A. Calver and J. D. C. Hemsley. 2.30 p.m. Geological Society Lecture Hall, Burlington House, Piccadilly, London, W.1.

Society for Analytical Chemistry

October 5. Original Papers. 7 p.m. Meeting Room of the Chemical Society, Burlington House, London, W.1.

October 12. "The analytical chemistry of chromium and vanadium," by G. M. Holmes. 7 p.m. The Technical College, Coventry.

October 12. "Biological assay of insecticidal residues," joint meeting with Pesticides Group of S.C.I. 7 p.m. Meeting Room of the Chemical Society, Burlington House, London, W.1.

October 21. "Some observations on analytical chemistry," by J. Haslam. Salisbury.

October 25. Joint meeting with the Thames Valley section of the R.I.C. on "Nuclear magnetic resonance." Oxford. Preceded by a visit to A.E.R.E., Harwell.

October 27. "The analysis of formulation of the structure of dyestuffs and the application of dyestuffs to chemical analysis," by F. K. Sutcliffe. 7 p.m. The Technical College, Nottingham.

October 28. "Some aspects of the analytical chemistry of the heteropolymolybdates," by R. A. Chalmers and A. G. Sinclair. "A colorimetric determination of sulphite," by W. Moser, R. A. Chalmers and A. G. Fogg, and "Some factors affecting the use of amalgams as reductants," by R. A. Chalmers, W. Moser and D. A. Thomson. Royal Society of Edinburgh, 22 George Street, Edinburgh 2.

November 2. "Analysis of semi-conductors." 2.30 p.m. The Wellcome Building, Euston Road, London, N.W.1.

November 4. "The analytical chemistry of phosphorus," by N. T. Wilkinson. 7.15 p.m. Great Northern Hotel Leeds.

Institution of Chemical Engineers

October 20 *and* 21. Symposium on "Adsorption in Industry." Livery Hall, Guildhall, London, E.C.2.

Society of Instrument Technology

October 18. Works visit to Albright and Wilson (Mfg.) Ltd., Kirkby Industrial Estate, nr. Liverpool.

October 20. "Analytical instruments for process control," by D. G. Stevenson. 7 p.m. Leapark Hotel, Grangemouth.

October 25. "Instrumentation past, present and future," by L. S. Yoxall. 6.30 p.m. Manson House, 26 Portland Place, London, W.1.

Institution of Production Engineers

October 5. "The industrial chemist and the production engineer," by H. J. Sharp. 7 p.m. The Royal Pavilion Hotel, Castle Square, Brighton.

Society for Applied Bacteriology

October 25. Autumn Meeting. Visit to Rothamsted Exp. St., Harpenden.

NEW PATENTS

COMPLETE SPECIFICATIONS ACCEPTED

Antibiotics

Antibiotic karnatakin and a process for the production and isolation thereof. *Raptakos, Brett and Co. Private Ltd.* 852,472.

Antibiotic tennecetin and processes of producing it. *University of Tennessee Research Corporation.* 852,883.

Pharmaceuticals

Medicaments for the treatment of tuberculosis. *Farbenfabriken Bayer A.G.* 853,120.

Ethers and means for producing same. *Parke, Davis and Co.* 852,974.

Thiazolidine, salts thereof and pharmaceutical compositions thereof. *Ciba Ltd.* 852,087.

Process for the preparation of active substances usable for therapeutic and diagnopurposes. *P. Niehans.* 853,289.

Process for the aseptic preparation of active substances usable for diagnostic and therapeutic purposes. *P. Niehans.* 853,290.

Steroids

6-methyl steroid compounds. *British Drug Houses Ltd.* 852,847.

1 : 6-dimethyl aromatic steroids and the preparation thereof. *British Drug Houses Ltd.* 853,012.

6-methyl steroid compounds. *British Drug Houses Ltd.* 852,684.

Steroid compounds and preparation thereof. *C. Pfizer and Co. Inc.* 852,647.

Miscellaneous

Process and apparatus for the preparation of urea from ammonia and carbon dioxide. *Stamicarbon N.V.* 853,220.

Production of *p*-hydroxybenzoic acids. *Monsanto Chemicals Ltd.* 852,599.

Urea derivatives and process for the manufacture. *Farbwerke Hoechst Aktiengesellschaft vorm Meister, Lucius, and Brüning.* 852,422.

Benzoic acid amides and a process for their manufacture. *Farbwerke Hoechst.* 853,295.

New patents are from the *Journal of Patents*, and new trade marks are from the *Trade Marks Journal*. In each case permission to publish has been given by the controller of Her Majesty's Stationery Office. Each of the publications mentioned is obtainable from the Patent Office, 26 Southampton Buildings, London, W.C.2.

NEW TRADE MARKS

APPLICATIONS

Pharmaceuticals

ROLAIDS.—789,928. *American Chicle Company.*

INTROZAINE.—796,203. *Calmic Ltd.*

THYBON.—796,430. *Farbwerke Hoechst A.G.*

TYORDAC.—796,916. *Dales Pharmaceuticals Ltd.*

LIQUINURE.—797,192. *Liquinure Sales Ltd.*

ERMYNS.—799,193. *Horace Steven Coaker.*

SYMPOSED.—799,542. *The Wellcome Foundation Ltd.*

AURACET.—801,178. *Ward, Blenkinsop and Co. Ltd.*

SCORPRIN.—802,676. *Wigglesworth Ltd.*

AMALGOVAX.—802,933. *Bayer Products Ltd.*

VIOTONIC.—775,470. *H. and T. Kirby and Co. Ltd.*

NORMOTYRIN.—791,304. *Südmedica Gesellschaft mit Beschränkter Haftung.*

UREAPHIL.—794,889. *Abbott Laboratories.*

PRINTAR.—795,619. *Printar Industries Ltd.*

RAPORAN.—798,110. *Roche Products Ltd.*

SAPACILLIN.—798,368. SAPADILLIN. — 798,369. SAPADIN. — 798,370. *Beecham Research Laboratories Ltd.*

PENVELETS.—798,370. *Abbott Laboratories.*

SENAGRAN.—801,744. *The British Drug Houses Ltd.*

QUEEZE.—802,032. *British Glandular Products Ltd.*

BACTROBAN.—802,762. *Beecham Research Laboratories Ltd.*

TRANSPHARM.—802,792. *Transpharm G.m.b.H.*

TRIOMINICIN.—803,006. *A. Wander Ltd.*

TOPIDEX.—803,112. *Les Laboratoires Français de Chimiotherapie S.A.*

PABEGAN.—803,715. TETRICORT.—803,718. XECAIN.—803,719. *Aktiebolaget Bofors.*

SALUPRES.—786,941. *Merck and Co. Inc.*

JEPADD.—795,971. *H. C. Moore Ltd.*

EUSTOMIN.—797,236. *The Wellcome Foundation Ltd.*

CLORAPRIM.—798,093. *I.C.I. Ltd.*

Manufacturing Chemist's **ENQUIRY BUREAU**

Leonard Hill House, Eden Street, London, N.W.1.

Subscribers requiring names of suppliers of chemicals or plant should state their needs on this form, giving approximate quantities, clip it to their business noteheading and send it to the Bureau, as above. Please type or use block letters.

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NEW COMPANIES

These particulars of new companies have been extracted from the daily register of Jordan and Sons Ltd. company registration agents, Chancery Lane London, W.C.2.

Crabtree's Chemists Ltd. 28.7.60. Pett House, Stockbury, Kent. £1,000. Dirs.: Lawrence W. and Patricia E. Crabtree.

H. R. Gilby (Chemists) Ltd. 28.7.60. 19 Charing Cross Rd., London, W.C.2. £1,000. Dirs.: Harold R. and Irene M. Gilby.

Frank Williams (Acton) Ltd. 29.7.60. 131 The Vale, London, W.3. Dispensing and retail chemists, etc. £5,000. Dirs.: Arthur H. F. and Clarice Williams.

Detersan Ltd. 8.8.60. Mnfrs. of and dlrs. in toilet preparations, cosmetics, etc. £100; Dirs.: not named. Subs.: Dermasan Ltd., 85 London Wall, London, E.C.2 (R. Millet', dir.).

H. W. Boddy Ltd. 9.8.60. 3/4 Grand Parade, Kinson, Bournemouth. Chemists, druggists, opticians, etc. £1,000. Dirs.: Harold W. and Olive E. Boddy.

Shadler Ltd. 10.8.60. Mnfrs. and dlrs. in chemical hairdressings, toilet goods, perfumes, soaps, etc. £100. Dirs.: to be appointed. Subs.: Harry Shadler and Roderick J. Eveleigh, C.A., 14 Grand Parade, Brighton.

Day-Lewis (Halstead) Ltd. 11.8.60. 2, The Square, Riverhead, Sevenoaks, Kent. Chemists, druggists, opticians, etc. £100. Dirs.: Lilian K. G. Barnes, Philip W. Barnes, A. Davidson.

Cyril H. Smith (Chemists) Ltd. 15.8.60. Moor Street, W. Bromwich, Staffs. £3,000. Dirs.: Cyril H. and Mrs. Harriett C. Smith, and C. J. Smith.

H. Oakley Ltd. 15.8.60. 406 Bank Chambers, 329 High Holborn, London, W.C.1. Chemists. £1,000. Dirs.: Horace and Harry R. Oakley.

J. S. Gatley Ltd. 15.8.60. 2 Enfield Road, Monton, Eccles, Lancs. Chemists. £1,000. Dirs.: John S. and Irene Gatley.

Stennels Close Pharmacy Ltd. 19.8.60. 45 Stennels Close, Coventry. £100. Dirs.: John and Sallie Williams.

Sixty-Five Years Ago

From MANUFACTURING CHEMIST

October 1895

Notes from Foreign Contemporaries

The *Hawaiian Gazette* refers to the candle nut, which grows plentifully in the island. It is appreciated by the natives, but would seem to deserve the careful attention of manufacturing chemists. It seems that if the nuts are roasted in the shells, and the kernels then worked into a paste flavoured with pepper and salt, a splendid appetiser, rivalling caviar, is produced. The green husk contains an acid juice which has a local reputation as a cure for sore throats. From the burnt shell the natives formerly obtained an indelible ink or dye, which they utilised for tattooing purposes. From the bark a gum exudes, which serves as an excellent substitute for gum arabic and gum tragacanth, and could be used for confectionery, medicated jujubes, etc. The Hawaiians use it in obstinate cases of dysentery. It will thus be seen that the nut trees are valuable, and might be worked up profitably with a little enterprise.